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1998

EPA Superfund
Record of Decision:

CAMP LEJEUNE MILITARY RES. (USNAVY)
EPA ID: NC6170022580
OU 12
ONSLOW COUNTY, NC
01/20/1998

EPA 541-R98-019

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
100 ALABAMA STREET, S.W.
ATLANTA, GEORGIA 30303-3104

JAN 20 1998

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

4WD-FFB

Commanding General
Building 1
Marine Corps Base
Camp Lejeune, North Carolina 28542

SUBJ: Record of Decision
Operable Unit 11, Sites 7 & 80
MCB Camp Lejeune NPL Site
Jacksonville, North Carolina

Dear Sir:

The U.S. Environmental Protection Agency (EPA) Region 4 has reviewed the above subject decision document and concurs with the selected remedy for the Remedial Action at Operable Unit 11. This remedy is supported by the previously completed Remedial Investigation and Baseline Risk Assessment Reports.

The selected remedial alternative is no further action. This involves taking no further remedial actions at the site and leaving the environmental media as they currently exist. This remedial action is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action and is cost effective.

EPA appreciates the coordination efforts of MCB Camp Lejeune and the level of effort that was put forth in the documents leading to this decision. EPA looks forward to continuing the exemplary working relationship with MCB Camp Lejeune and Atlantic Division Naval Facilities Engineering Command as we move toward final cleanup of the NPL site.

CC: Elsie Munsell, Deputy Assistant Secretary of the Navy
Neal Paul, Camp Lejeune
Kate Landman, LANTDIV
Dave Lown, NCDEHNR

Ms. Gena Townsend
Remedial Project Manager
US EPA Region IV
Atlanta Federal Center
Waste Management Division
Federal Facilities Branch
100 Alabama Street SW
Atlanta, Georgia 30303

Dear Ms. Townsend:

On August 21, 1997, Major General Ray L. Smith, Commanding General for Marine Corps Base, Camp Lejeune signed the Record of Decision (ROD) for Operable Unit Number 11 (Sites 7 and 80).

This ROD is enclosed for your records. We appreciate your agency's concurrence and will now proceed with the implementation of institutional controls that will ensure protection of human health and the environment.

If you have any questions or comments, please contact Mr. Mick Senus, Installation Restoration Division, Environmental Management Department, at telephone (910) 451-5068.

Enclosure: 1. Record of Decision for Operable Unit No.11

Copy to: (w/encl)
COMLANTNAVFACENGCOM (Code 1823, K. Landman)
CMC (LFL, K. Dryer)

FINAL

RECORD OF DECISION
OPERABLE UNIT NO. 11
(SITES 7 AND 80)

MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

CONTRACT TASK ORDER 0274

APRIL 10, 1997

Prepared For:

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND
Norfolk, Virginia

Under:

LANTDIV CLEAN Program
Contract N62470-89-D-4814

Prepared by:

BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania

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LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirements
Baker	Baker Environmental, Inc.
BCF	bioconcentration factor
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	contaminant of potential concern
DoN	Department of the Navy
HI	hazard index
ICR	incremental lifetime cancer risk
IRP	Installation Restoration Program
MCB	Marine Corps Base
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
Ig/kg	micrograms per kilogram
Ig/L	micrograms per liter
NC DEHNR	North Carolina Department of Environment, Health, and Natural Resources
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NCWQS	North Carolina Water Quality Standard
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PRAP	Proposed Remedial Action Plan
QI	quotient index
RA	Risk Assessment
RBC	Risk-Based Concentration
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SSV	sediment screening value
SVOC	semivolatile organic compound
SSSV	surface soil screening value
SWSV	surface water screening value
TAL	Total Analyte List
TCL	Target Compound List
TDS	total dissolved solids
TSS	total suspended solids
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

DECLARATION

Site Name and Location

Operable Unit No. 11

(Site 7 - the Tarawa Terrace Dump, and Site 80 - the Paradise Point Golf Course Maintenance Area)
Marine Corps Base
Camp Lejeune, North Carolina

Statement of Basis and Purpose

This decision document presents the selected remedy for Operable Unit (OU) No. 11 (Sites 7 and 80) at Marine Corps Base (MCB), Camp Lejeune, North Carolina. The remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1990 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record file for OU No. 11.

The Department of the Navy (DON) and the Marine Corps have obtained concurrence from the State of North Carolina Department of Environment, Health and Natural Resources (NC DEHNR) and the United States Environmental Protection Agency (USEPA) Region IV on the selected remedy.

Description of the Selected Remedy: No Action

The selected remedy for OU No. 11 is the "no action" plan. The "no action" plan involves taking no further remedial actions at OU No. 11. This includes conducting no further environmental investigations or sampling.

At Site 80, a Time-Critical Removal Action (TCRA) was completed prior to implementation of the "no action" plan. Under the TCRA, pesticide and arsenic contaminated surface soil was excavated, removed from the site, and disposed. The applicability of the "no action" plan at Site 80 was dependent on the implementation of this TCRA. The TCRA reduced current human health risks to within acceptable limits, and eliminated contaminated surface soil from being a future potential source of groundwater contamination.

DECISION SUMMARY

1.0 INTRODUCTION

This Record of Decision (ROD) document presents the final remedial action plan selected for Operable Unit (OU) No. 11 at Marine Corps Base (MCB), Camp Lejeune. OU No. 11, one of 18 operable units at the Base, consists of two sites:

- Site 7, the Tarawa Terrace Dump
- Site 80, the Paradise Point Golf Course Maintenance Area

The environmental media at both sites were investigated as part of a Remedial Investigation (RI) conducted for OU No. 11. Based on the results of the RI, preferred remedial action alternatives were identified for both sites in a Proposed Remedial Action Plan (PRAP) document. Then, the public was given an opportunity to comment on the RI and the PRAP. Based on comments received during the public comment period, and any new information that became available in the interim, a final remedial action plan was selected for OU No. 11. This ROD document presents the final selected remedy for OU No. 11 along with a summary of the remedy selection process.

1.1 Description of Operable Unit No. 11

Located in Onslow County, North Carolina, MCB, Camp Lejeune is a training base for the United States Marine Corps. The Base covers approximately 236 square miles and includes 14 miles of coastline. MCB, Camp Lejeune is bounded to the southeast by the Atlantic Ocean, to the northeast by State Route 24, and to the west by U.S. Route 17. The town of Jacksonville, North Carolina is located north of the Base.

OU No. 11 is one of 18 Operable Units located within MCB, Camp Lejeune. Operable Units were developed at the Base to combine one or more individual sites that share a common element. In the case of OU No. 11, Sites 7 and 80 were grouped together because of their close geographic proximity and the detection of pesticides in soil at both sites.

Figure 1 depicts the location of OU No. 11 within MCB, Camp Lejeune. As shown, OU No. 11 is located on the northeastern portion of the Base, situated on either side of Northeast Creek. Site 7 is located on the creek's northern bank, and Site 80 is located on the southern bank.

1.2 Report Organization

The Decision Summary is organized into six main sections. Section 1.0 presents an introduction to the ROD document. Sections 2.0 and 3.0 present pertinent background information and the selected remedies for Sites 7 and 80, respectively. Section 4.0 presents the selected remedy for OU No. 11, which is a combination of the individual remedies selected for Sites 7 and 90. Section 5.0 evaluates the selected remedy for OU No. 11 with respect to the statutory determinations (i.e., the five requirements identified in the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] Section 121). Finally, Section 6.0 presents the responsiveness summary which contains a history of community involvement and a summary of die comments received during the public comment period.

2.0 Site 7

Section 2.0, which focuses on Site 7, presents the following information: a site name, location, and description; a site history and a summary of previous investigations and enforcement activities; highlights of community participation; the scope and role of the response action; a summary of the site characteristics; a summary of the site risks; and the selected remedy.

2.1 Site Name, Location, and Description

Site 7, located approximately 8 mile south of the Tarawa Terrace Housing Complex, is referred to as the Tarawa Terrace Dump. Figure 2 presents a site map depicting the site boundaries and land features. As shown, Site 7 is bordered by the Tarawa Terrace Housing Complex to the north and northwest, the Tarawa Terrace Community Center (Building No. TT44) to the northeast, Northeast Creek to the south, the Tarawa Terrace Wastewater Treatment Plant to the southwest, and an unnamed road that leads to the wastewater treatment plant to the west. Most of Site 7, including

the marsh/swamp area that borders Northeast Creek, is densely wooded.

Within the site boundaries, two unnamed surface water bodies (referred to in this report as the Eastern and Western Tributaries) flow south into Northeast Creek. Northeast Creek flows west and eventually empties into the New River. The site also contains a smaller tributary (referred to in this report as the drainage ditch) that flows southeast into the Western Tributary. Northeast Creek, the Eastern and Western Tributaries, and the drainage ditch are all tidally influenced. During high tide, ponded water covers most of the marsh/swamp area.

Based on a site reconnaissance (conducted in March 1994 as part of the RI) and a review of historical information, four areas of concern were identified at Site 7. The first area of concern is a potential dump area located cast of the utility right-of-way. The second area of concern is a smaller cleared area located west of the utility night-of-way. Both areas of concern were identified using aerial photographs from 1973 and 1978. The third area of concern, identified based on elevated pesticides and polychlorinated biphenyl (PCB) levels detected during previous investigations, is located south of the community center. The fourth area of concern is located east of the Tarawa Terrace Wastewater Treatment Plant and adjacent to the drainage ditch. Visual debris, including paint cans, motor oil cans, and other rusted cans, were observed in this wooded area.

2.2 Site History and Previous Investigations/Enforcement Activities

2.2.1 Site History

Site 7 is known to be a former dump that was used during the construction of the Tarawa Terrace housing complex. The precise years that the dump was in operation are unknown, but it was reportedly closed in 1972. Historical records do not indicate that hazardous materials were disposed at this site. However, construction debris, wastewater treatment plant filter media, and household trash are known to have been disposed.

2.2.2 Previous Investigations/Enforcement Activities

Previous investigations conducted at Site 7 include a Site Inspection (1991) and a Remedial Investigation (1994-96). The following paragraphs briefly describe these investigations. More detailed information is located in the Site Inspection Report (Halliburton/NUS, 1991) and the Remedial Investigation Report (Baker Environmental, Inc., 1996).

Site Inspection, 1991

In June 1991, Hilliburton/NUS conducted a Site Inspection that included the following field activities:

- Soil Investigation (8 surface soil samples collected from 0 to 2 feet below ground surface [bgs]; 5 subsurface soil samples collected from 3 to 12 feet bgs; samples analyzed for full Target Compound List [TCL] organics, Target Analyte List [TAL] Inorganics, and cyanide)

- Groundwater Investigation (installation of 3 shallow monitoring wells; 3 samples collected from these wells; samples analyzed for full TCL organics, TAL total inorganics, and cyanide)

Figure 3 identifies sampling locations associated with the Site Inspection.

Table 1 presents the results of soil sample analyses. Both surface and subsurface soil samples collected from locations 7-MW02, 7-SB01, and 7-SB02 contained pesticides and PCBs. The maximum concentrations of dieldrin (2,500 micrograms per kilogram [Ig/kg]) and endrin (1,300 Ig/kg) were detected at 7-MW02 (7.5 to 9.5 feet bgs). The maximum concentration of endosulfan HI (2,000 Ig/kg) was detected at 7-SB02 (7 to 9 feet bgs). The compound known as Aroclor 1260 was detected in a total of seven surface and subsurface soil samples. Aroclor-1260 concentrations ranged from 108 Ig/kg at 7-SB05 (0 to 2 feet bgs) to 25,000 Ig/kg at 7-MW02 (7.5 to 9.5 feet bgs).

Table 2 presents the results of groundwater sample analyses. Two pesticides, dieldrin and endrin ketone, were detected at low levels (0.63 micrograms per liter [Ig/l] and 0.09 Ig/l,

respectively) in the groundwater sample collected from 7-MW02. Four inorganic constituents (manganese, chromium, lead, and iron) were detected at levels that exceeded either North Carolina Water Quality Standards (NCWQSs), or Federal Maximum Contaminant Levels (MCLs) for drinking water (i.e., the state and federal regulatory standards). The concentrations that exceeded state and/or federal standards are shaded in Table 2.

Remedial Investigation, 1994-96

In October 1994, Baker Environmental, Inc. (Baker) initiated an RI at Site 7 which included the following field activities:

- Surface Soil Investigation (35 samples collected from 0 to 1 foot bgs; samples analyzed for full TCL organics and TAL inorganics)
- Confirmatory Surface Soil Investigation (18 samples collected from 0 to 1 foot bgs; samples analyzed for TCL PCBs)
- Subsurface Soil Investigation (28 samples collected from 1 foot bgs to just above the groundwater table; 5 of the 28 were collected from test pit excavations; samples analyzed for full TCL organics and TAL inorganics)
- Confirmatory Subsurface Soil Investigation (16 samples collected from 1 foot bgs to just above the water table; samples analyzed for TCL PCBs)
- Groundwater Investigation - Round One (installation of 2 permanent shallow monitoring wells and 3 temporary shallow monitoring wells; 8 samples collected from the 5 newly installed wells and 3 existing "Shallow wells; samples analyzed for full TCL organics, and TAL inorganics [total and dissolved fractions])
- Groundwater Investigation - Round Two (3 samples collected from existing wells; samples analyzed for TAL inorganics [total and dissolved fractions], total dissolved solids [TDS], and total suspended solids [TSS]
- Groundwater Investigation - Round Three (3 samples collected from existing wells; samples analyzed for TAL inorganics [total and dissolved fractions], TDS, and TSS)
- Surface Water Investigation (a total of 13 samples collected from the drainage ditch that discharges to the Western Tributary, the Western Tributary itself, the Eastern Tributary, and Northeast Creek; samples analyzed for full TCL organics and TAL inorganics)
- Sediment Investigation (a total of 27 samples collected from the drainage ditch that discharges to the Western Tributary, the Western Tributary itself, the Eastern Tributary, and Northest Creek; samples analyzed for full TCL organics and TAL inorganics)
- Ecological Investigation (a total of 6 benthic macroinvertebrate samples collected from the Western Tributary and Northeast Creek; aquatic survey; earthworm bioaccumulation study)
- Habitat Evaluation (site reconnaissance in which botanical and animal species were identified and documented; collection of unknown botanical species for further identification)

Figures 4, 5, and 6 depict sampling locations associated with the RI. Figure 4 identifies surface and subsurface soil sampling locations; Figure 5 identifies groundwater sampling locations; and Figure 6 identifies surface water, sediment, benthic macroinvertebrate, and earthworm sampling locations.

Table 3 summarizes the results of soil, groundwater (round one), surface water, and sediment sample analyses. In this table, shaded blocks indicate constituents that were detected in exceedence of the comparison criteria (e.g., federal standards, state standards, background levels). As shown, several inorganic constituents exceeded comparison criteria in surface and

subsurface soil samples. In groundwater samples, one volatile organic compound (VOC), chloroform, exceeded its state standard. However, the chloroform concentrations were less than 10 times the concentrations detected in quality control samples. As a result, chloroform was most likely a laboratory-related contaminant rather than a site-related contaminant. Five inorganic constituents (aluminum, chromium, iron, lead, and manganese) also exceeded their comparison criteria in groundwater samples. In surface water and sediment, semivolatile organic compounds (SVOCs), pesticides, and inorganic constituents were detected at levels that exceeded comparison criteria.

Table 4 summarizes inorganic results from groundwater sampling rounds one, two, and three. During the round one sampling event, aluminum, chromium, iron, lead, and manganese were detected at levels exceeding the federal and/or state standards. However, these exceedances were believed to be due to the nature and location of the wells sampled and the sampling procedures that were employed, rather than a site-related inorganics problem. To confirm this, the State of North Carolina requested a second sampling round. Aluminum and iron were the only inorganics detected at levels exceeding standards during the round two sampling event. To further ensure that the site does not contain inorganics contamination, the State requested a third sampling round. Once again, only aluminum iron were detected above standards. Based on this information, it does not appear as though there is a site-related inorganics problem. Aluminum does not pose a problem because the federal standard for this inorganic is only a secondary, non-enforceable MCL. Iron does not pose a problem because it naturally occurs groundwater at the Base at levels exceeding standards.

2.3 Highlights of Community Participation

The RI report for Site 7 and the PRAP for OU No. 11 were released to the public on February 5, 1997. These documents are available in an administrative record file at information repositories maintained at the Onslow County Pubhc Library and at the Installation Restoration Division Office (Room 238, MCB, Camp Lejeune). Also, all addresses on the OU No. 11 mailing list were sent a copy of the Final PRAP and Fact Sheet. The notice of availability of the PRAP and RI document was published in the "Jacksonville Daily News" on February 2, 1997. A public comment period was held from February 5 to March 7, 1997. In addition, a public meeting was held on February 5, 1997 to respond to questions and to accept public comments on the PRAP for OU No. 11. The public meeting minutes were transcribed and a copy of the transcript is available to the public at the aforementioned locations. A Responsiveness Summary, included as part of this ROD, has been prepared to respond to the significant comments, criticisms, and new relevant information received during the comment period. Upon signing this ROD, MCB, Camp Lejeune and the DoN will publish a notice of availability for the ROD in the local newspaper, and place this ROD in the information repositories.

2.4 Scope and Role of the Response Action

Because Sites 7 and 80 are geographically separated, separate response actions, or selected remedies, were developed for each site. The response action, or selected remedy, for OU No. 11 is a combination of the two separate response actions developed for Sites 7 and 80, respectively. Section 2.4 of this ROD presents the response action developed for Site 7; Section 3.4 presents the response action developed for Site 80; and Section 4.0 presents the response action developed for OU No. 11.

The response action for Site 7 was developed to address site conditions that appear to be protective of human health and the environment. (Site conditions appear to be protective based on the results of the human health and ecological risk assessments [RAs] and additional groundwater sampling rounds conducted during the RI.) As a result, the only response action identified and evaluated for Site 7 was the "no action" plan.

2.5 Summary of Site Characteristics

Site 7 exhibited the following site characteristics, as determined during the RI:

- Some VOCs were detected in soil, including acetone, 2-butanone, trichloroethene, and toluene in surface soil, and acetone and methylene chloride in subsurface soil. All of these VOCs, with the exception of toluene in surface soil, are believed to be the result of laboratory contamination. The toluene is believed to be the result of a

random, isolated spill that is not indicative of a significant toluene problem at the site. The maximum toluene concentration (461 Ig/kg) did not exceed the comparison criterion of 1,600,000 Ig/kg which is a United States Environmental Protection Agency (USEPA) Region III Risk-Based Concentration (RBC).

- Polynuclear aromatic hydrocarbons (PAHs) were the most prevalent SVOCs detected in soil. The positive detections of PAHs in both surface and subsurface soil were primarily located in the northern and eastern portions of the site. PAHs were not detected in the groundwater.

- Pesticides were infrequently detected in surface and subsurface soil samples. The pesticides dieldrin, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, endosulfan II, alpha-chlordane, and gamma-chlordane were the most prevalent pesticides detected in soil. Pesticide concentrations detected at the site are similar to pesticide concentrations detected across the Base. In some cases, pesticide concentrations at the site were lower than Base pesticide concentrations. Consequently, the pesticides are believed to be the result of historical Base-wide pest control spraying. Dieldrin was the only pesticide detected in groundwater, and it was only detected in one groundwater sample.

- Trace levels (i.e., less than 0. 10 milligrams per kilogram [mg/kg]) of Aroclors 1254 and 1260 were detected in a limited number of surface and subsurface soil samples. Aroclor 1254 was not detected in the subsurface soil. The random occurrence of these contaminants may be due to the past disposal of oils. These contaminants were not detected in the groundwater.

- The occurrence of inorganics was widespread in both the surface and subsurface soil. Inorganics which exceeded surface soil and subsurface soil Base background concentrations included aluminum, barium, beryllium, calcium, nickel, and zinc. The sporadic and random locations of these exceedences, however, do not suggest a significant inorganic contamination problem in either the surface or subsurface soil.

- In groundwater samples, one VOC, chloroform, exceeded its state standard. However, the chloroform concentrations were less than 10 times the concentrations detected in quality control samples. As a result, chloroform was most likely a laboratory-related contaminant rather than a site-related contaminant.

- During the first round of groundwater sampling, five inorgarnic constituents (aluminum, chromium, iron, lead, and manganese) exceeded their comparison criteria. During the second and third groundwater sampling rounds, aluminum and iron were the only inorganics detected above the criteria. However, the criterion for aluminum is only a secondary, non-enforceable federal MCL. As a result, aluminum does not appear to represent a significant site-related problem. Iron also does not pose a problem because it naturally occurs in groundwater at the Base at levels exceeding standards.

- Levels of arsenic, iron, and manganese in the surface water exceeded federal criteria. With the exception of dieldrin, no other organic contaminants exceeded surface water criteria. No sediment contaminant concentrations exceeded sediment criteria.

2.6 Summary of Site Risks

As part of the RI, a human health RA and an ecological RA were conducted to determine the potential risks associated with the chemical constituents detected at Site 7. The following subsections briefly summarize the findings of these RAs.

2.6.1 Human Health Risk Assessment

During the human health RA, contaminants of potential concern (COPCs) were selected for surface soil, subsurface soil, groundwater, surface water, and sediment, as shown in Table 5. The

selection of COPCs was based on criteria provided in the USEPA Risk Assessment Guidance for Superfund.

For each COPC, incremental lifetime cancer risk (ICR) values and hazard index (HI) values were calculated to quantify potential carcinogenic and noncarcinogenic risks, respectively. Table 6 presents ICR and HI values for each environmental medium and receptor evaluated. (Receptors included current residential children and adults, future residential children and adults, and future construction workers.) Table 6 also presents total ICR and HI values, which represent risks to all environmental media combined, for each receptor.

Shaded blocks in Table 6 indicate an ICR value that exceeds the USEPA acceptable limit of 1E-04, or an HI value that exceeds the USEPA acceptable limit of 1.0. As shown, unacceptable risk values include: the HI for future child residents exposed to groundwater (8.8); the ICR for future adult residents exposed to groundwater (1.6E-04); and the HI for future adult residents exposed to groundwater (3.8). Although these values exceed acceptable limits, the risk they represent appears to be insignificant for the following reasons:

Future Residential Child: Groundwater HI = 8.8

The HI value of 8.8 exceeds the acceptable limit of 1.0, thus indicating potential for risk upon exposure. However, the future residential development of Site 7 is highly unlikely because it is a tidally influenced swamp area. As a result, the future residential scenario is highly unlikely and so are the risks it generates. Additionally, potable water is currently supplied through the Bases public water supply system. This system will likely be utilized, rather than an on site groundwater source, in the event of future construction.

The main contributor to the HI value of 8.8 was aluminum, which accounted for approximately 64 percent of the risk. Aluminum was detected at concentrations ranging from 959 to 88,800 Ig/L in all three sampling rounds. However, the federal standard for aluminum (50 Ig/L) is only a Secondary MCL (established to maintain the aesthetics of potable water) that is not enforceable; there is no state standard. There is no apparent pattern to the positive detections of aluminum at Site 7, and there does not appear to be a significant site-related source of aluminum. Based on this information, the HI of 8.8, primarily based on aluminum concentrations, may be an overestimate of the risk that actually exists at Site 7.

Future Residential Adult: Groundwater ICR = 1.6E-04

The ICR value of 1.6E-04 only slightly exceeds the acceptable limit of 1E-04, thus indicating only a slight potential for risk. In addition, the future residential development of Site 7 is highly unlikely because it is a tidally influenced swamp area. As a result, the future residential scenario is highly unlikely and so are the risks it generates. As previously mentioned, the Base's public water supply system, rather than an on site groundwater source, will likely be utilized in the event of future construction.

The main contributor to the ICR value of 1.6E-04 was beryllium, which accounted for approximately 76 percent of the risk. However, beryllium was only detected in unfiltered groundwater samples (i.e., total inorganics; samples) during the first sampling round. Beryllium was not detected in any of the filtered groundwater samples (i.e., dissolved inorganics samples) nor was it detected in the second or third sampling rounds. As a result, high beryllium levels appear to be the result of suspended solids in the unfiltered samples rather than a site-related source. Based on this information, the ICR of 1.6E-04, which is primarily based on beryllium concentrations, is most likely an overestimate of the risk that actually exists at Site 7.

Future Residential Adult: Groundwater HI = 3.8

The HI value of 3.8 exceeds the acceptable limit of 1.0, thus indicating potential for risk. In addition, the future residential development of Site 7 is highly unlikely because it is a tidally influenced swamp area. As a result, the future residential scenario is highly unlikely and so are the risks it generates. As previously mentioned, the Base's public water supply system, rather than an on site groundwater soruce, will likely be utilized in the event of future construction.

The main contributor to the HI value of 3.8 was aluminum, which accounted for approximately 64

percent of the risk Aluminum was detected at concentrations ranging form 959 to 88,800 Ig/L in all three sampling rounds. However, the federal standard for aluminum (50 Ig/L) is only a Secondary MCL (established to maintain the aesthetics of potable water) that is not enforceable; there is no state standard. There is also no apparent pattern to the positive detections of aluminum at Site 7, and there does not appear to be a significant site related source of aluminum. Based on this information, the HI of 8.8, primarily based on aluminum concentrations, may be an overestimate of the risk that actually exists at Site 7.

Although these risk values exceed USEPA acceptable limits, the risks they represent do not warrant a remedial action. In addition, these risks were only based on inorganic results obtained during the fast groundwater sampling round. Inorganic results from the second and third rounds indicated decreased concentrations which would further reduce potential risks. As a result, conditions at Site 7 may be considered protective of human health and the environment.

2.6.2 Ecological Risk Assessment

During the ecological RA, COPCs were selected for surface water, sediment, and surface soil, as shown in Table 7. Then, potential ecological risks associated with each COPC were evaluated. The following paragraphs summarize the conclusions made for aquatic and terrestrial receptors at Site 7.

Aquatic Receptors

Based on the results of the surface water, sediment, and benthic macroinvertebrate sampling at the Western Tributary freshwater stations, there may be a reduction in the benthic macroinvertebrate population in this surface water body. However, the source of this reduction is not known. It may be the result of site-relatod inorganics in the surface water, non site-related pesticides in the sediment tributary washout that occurred during high rainfall events, or periodic High tidal events. Regardless, the population reduction appears to recover by the downstream saltwater station.

In addition, the aquatic population at the Western Tributary (in particular, the species density and diversity) is similar to the population at off site reference stations. There were also no exceedences of surface water screening values (SWSVs) or sediment screening values (SSVs) at the Western Tributary station. As a result, conditions in the Western Tributary do not appear to represent unacceptable ecological risks.

Based on the results of the surface water, sediment, and benthic macroinveirtebrate sampling at the Northeast Creek stations, there is no significant reduction in the benthic macroinvertebrate population for this surface water body. Lead was the only potentially site-related contaminant that exceeded a screening value. However, its exceedences were relatively minor (in surface water, lead was detected at a maximum concentration of 27.1 Ig/L which slightly exceeds the SWSV of 25 Ig/L; in sediment, lead was detected at a maximum concentration of 86J Ig/L which slightly exceeds the SSV of 46.7 Ig/L). In addition, the population at Northeast Creek (in particular, the species density and diversity) is similar to the population at off site reference stations. As a result, conditions in Northeast Creek do not appear to represent unacceptable ecological risks.

The benthic community in the drainage ditch and the Eastern Tributary were not determined. However, based on exceedences of SWSVs and SSVs, ecological impacts could potentially occur at these surface water bodies. In particular, some inorganics in surface water and pesticides in sediment could potentially impact the ecology. The pesticides in sediment are not considered site-related, but the inorganics in surface water may be site-related. However, the ecological risks were determined using inorganics concentrations in unfiltered surface water samples. Consequently, the actual ecological risks to inorganics in surface water will most likely be insignificant.

Terrestrial Receptors

Based on the comparisons of surface soil contaminant levels to surface soil screening values (SSSVs), there may be a reduction in the terrestrial flora and fauna population. However, the earthworm bioaccumulation study indicated that the SSSVs may have overestimated the potential risk. In addition, several worms that contained contaminant levels exceeding SSSVs were found in

areas containing no visible signs of stressed or dead vegetation.

Quotient Indices (QIs) generated using the Terrestrial Intake Model indicated that the cottontail rabbit, raccoon, and short-tailed shrew may potentially be at risk from contaminants in the surface water and surface sod. The risk to the rabbit, however, does not appear to be significant because the QI of 5.13 only slightly exceeds the acceptable QI level of 1.0. The QIs for the raccoon and short-tailed shrew are 70.4 and 311, respectively. Aluminum was the main contributor to these unacceptable risk values. However, based on the conservative nature of the model, and the assumption that aluminum is most likely not a site-related contaminant, the potential for a decrease in the raccoon and shrew population from site-related COPCs is expected to be low.

The conclusions of the ecological RA (for both aquatic and terrestrial receptors) indicate that although several SWSVs and SSSVs were exceeded, ecological risks at Site 7 appear to be minimal and do not warrant a remedial action. As a result, conditions at Site 7 may be considered protective of the environment.

2.7 Selected Remedy

The selected remedy for Site 7 is the "no action" plan. As its name suggests, the "no action" plan involves taking no further action at Site 7. This includes conducting no further environmental investigations or sampling. The site and all environmental media located within the site will remain as they currently are. The "no action" plan is justifiable because, based on the human health and ecological RAs and the three groundwater sampling rounds, conditions at Site 7 appear to be protective of human health and the environment.

3.0 SITE 80

Section 3.0, which focuses on Site 80, presents the following information: a site name, location, and description; a site history and a summary of previous investigations and enforcement activities; highlights of community participation; the scope and role of the response action; a summary of the site characteristics; a summary of the site risks; and the selected remedy.

3.1 Site Name, Location, and Description

Site 80, located northwest of Brewster Boulevard within the Paradise Point Golf Course, is referred to as the Paradise Point Golf Course Maintenance Area. The site consists of a one-acre area which is relatively flat, with a slight slope to the northeast.

Figure 7 presents a site map. As shown, Site 80 contains a machine shop (Building No. 1916), a maintenance building (Building No. 600), and a maintenance wash down area consisting of a concrete wash pad and sump. The wash pad is used to clean golf course maintenance equipment and the sump is used to collect water and oil runoff generated from the equipment cleaning. Water and oil collected by the sump travels into an oil/water separation pit located southeast of the wash pad.

A drainage ditch is located cast of the wash down area. During a March 1994 site reconnaissance, surface water runoff was observed flowing southeast across the site toward the drainage ditch. The drainage ditch then flows north past the eastern edge of the soil mound area. As shown on Figure 7, groundwater flow direction in the shallow aquifer is generally toward the northeast with a mounding effect near the washdown area.

The northeast portion of the site contains several large soil mounds that are overgrown with small pines. There is an open area located south of the mounds where golf course maintenance debris (i.e., tree limbs, lawn clippings, wooden timbers, and brush piles) is deposited. Evidence of burning operations conducted within this open area was observed during the March 1994 site reconnaissance. These soil mounds were generated from the installation of golf course ponds along the fairways in the late 1980s. It has been reported that wastes were disposed on or around the mounds. However, the types of waste that were disposed and the exact disposal locations are unknown. Employees of the maintenance garage were instructed not to use the soil from this area for fill material.

In addition, old maintenance equipment is scattered throughout the open and wooded areas surrounding Building No. 600. Two drums, identified during the March 1994 site reconnaissance, were removed from the site by Base personnel. These drums were located northeast of Building No. 600 just across the machine shop road. However, the contents of the drums are unknown.

Currently, a mobile trailer is stationed within the west/northwest portion of the site (i.e., the area located north of the machine shop road and east of the golf course road). Base personnel reported that a leach field associated with the golf courses sanitary sewer system is also located within this area (see Figure 7). However, the exact location of the leach field is not known. Based on an average groundwater elevation of 13 feet bgs in this area, the leach field is most likely located at a shallow depth.

3.2 Site History and Previous Investigations/Enforcement Activities

3.2.1 Site History

The Paradise Point Golf Course was constructed in the 1940s and Building No. 1916 was constructed in 1946. Reportedly, Site 80 has been used as a maintenance area since the initial construction of the golf course. Today, the maintenance area is still in operation. Current golf course maintenance operations include the machine shop (a potential source of waste oils), the equipment wash down area (a potential source of contaminated washwater), and the routine spraying of pesticides and herbicides.

3.2.2 Previous Investigations/Enforcement Activities

Previous investigations/enforcement activities conducted at Site 80 include a Site Inspection (1991), a Remedial Investigation (1994-95), and a Time-Critical Removal Action (1996). The following paragraphs briefly describe these investigations/activities. More detailed information is located in the Site Inspection Report (Halliburton/NUS, 1991), the Remedial Investigation Report (Baker, 1996), and the Contractor's Closeout Report for the Time-Critical Removal Action (OHM Remediation Services Corp., 1996).

Site Inspection, 1991

In June 1991, Halliburton/NUS conducted a Site Inspection that included the following field activities:

- Soil Investigation (3 surface soil samples collected from 0 to 6 inches bgs; 7 near surface soil samples collected from 0 to 2 feet bgs, and 7 subsurface soil samples collected from 3 to 17 feet bgs; samples analyzed for full TCL organics and Chlorinated herbicides)

- Groundwater Investigation (installation of 3 shallow monitoring wells; 3 samples collected from these wells; samples analyzed for full TCL organics and chlorinated herbicides)

- Surface Water/Sediment Investigation (3 surface water samples and 5 sediment samples collected from the drainage ditch; samples analyzed for full TCL organics, chlorinated herbicides, and total petroleum hydrocarbons)

Figure 8 identifies sampling locations associated with the Site Inspection.

Table 8 presents the results of soil sample analyses. As shown, several pesticides, including aldrin, chlordane, 4,4'-DDD and its metabolites (4,4'-DDE and 4,4'-DDT), and dieldrin, were detected in these samples. The pesticide 4,4'-DDD was reported at the greatest concentration (700 I/kg in sample SB02-0002). Herbicides were not detected in any of the samples. In addition, the PCB Aroclor 1254 was detected in two discrete surface soil locations (80-SB02 and 80-MW03) at concentrations of 830 Ig/kg and 1,500 Ig/kg, respectively.

Table 9 presents the results of groundwater sample analyses. As shown, four VOCs (toluene at 180 Ig/L, ethylbenzene at 5 Ig/L, xylene at 21 Ig/L, and carbon disulfide at 25 Ig/L) were detected in the groundwater sample collected from monitoring well 80-MW03.

Table 10 presents the results of surface water sample analyses. It should be noted that originally five surface water samples were proposed. However, when the investigation was conducted, sampling locations 80-SW01 and 80-SW02 contained no water. As shown on Table 10, all three surface water samples contained acetone at concentrations ranging from 11 to 190 Ig/L. Surface water samples from locations 80-SW04 and 80-SW05 also exhibited toluene at concentrations of 30 Ig/L and 140 Ig/L, respectively, and total petroleum hydrocarbons at concentrations of 1390 Ig/L and 1660 Ig/L, respectively.

No contaminants were detected in sediment sample analyses.

Remedial Investigation, 1994-95

In October 1994, Baker initiated an RI at Site 80 which included the following field activities:

- Site Survey
- Surface Soil Investigation (37 samples, including 3 background samples, collected from ground surface to one foot bgs; analyzed for full TCL organics and TAL inorganics)
- Additional Surface Soil Investigation Focused on the West/Northwest Portion of Site 80 (21 samples collected from ground surface to one foot bgs; samples analyzed for TCL pesticides)
- Subsurface Soil Investigation (38 samples collected from one foot bgs to just above the groundwater table; samples analyzed for full TCL organics and TAL inorganics)
- Additional Subsurface Soil Investigation Focused on the West/Northwest Portion of Site 80 (13 samples collected from one foot bgs to just above the groundwater table; samples analyzed for TCL pesticides)
- Groundwater Investigation (installation of 4 shallow monitoring wells and one intermediate monitoring well; 8 samples from 5 newly installed wells and 3 existing shallow wells; samples analyzed for full TCL organics and TAL inorganics [total and dissolved fractions])
- Additional Groundwater Investigation Focused on the West/Northwest Portion of Site 80 (installation of one shallow monitoring well [80-MW08]; one sample collected from this well; sample analyzed for TCL pesticides)
- Additional Groundwater Investigation of Inorganics in the Shallow Aquifer (9 samples collected from 9 on site wells; samples analyzed for TAL inorganics [total fraction only]; samples designated with the suffix -02)
- Habitat Evaluation (site reconnaissance in which botanical and animal species were identified and documented; collection of unknown botanical species for further investigation)

Figure 9 depicts the sampling locations associated with the RI. Table 11 summarizes the results of surface soil, subsurface soil, and groundwater sample analyses. In this table, shaded blocks indicate a constituent that was detected in excess of its comparison criteria (e.g., federal standards, state standards, background levels). As shown, several inorganic constituents exceeded comparison criteria in surface and subsurface soil samples. In groundwater samples, one SVOC, bis (2-ethylhexyl) phthalate, exceeded its comparison criterion. However, bis (2-ethylhexyl) phthalate concentrations were less than 10 times the concentrations detected in quality control samples. As a result, bis (2-ethylhexyl) phthalate appears to be a laboratory-related contaminant rather than a site-related contaminant. Six inorganic constituents (aluminum, arsenic, chromium, iron, lead, and manganese) also exceeded their comparison criteria in groundwater samples.

Time-Critical Removal Action, 1996

During the RI, pesticide and arsenic contaminated surface soil was detected at concentrations

that may pose potential risk to human health throughout Site 80. To address this contamination, a Time-Critical Removal Action was conducted from March to August 1996. Under the removal action, approximately 988 tons of contaminated soil was excavated and transported off-site to a disposal facility. Table 12 presents the remediation levels to which the contaminated soil was removed under the Time-Critical Removal Action. The excavation area at the site was then backfilled and revegetated.

3.3 Highlights of Community Participation

The RI report for Site 80 and the PRAP for OU No. 11 were released to the public on February 5, 1997. These documents are available in an administrative record file at information repositories maintained at the Onslow County Public Library and at the Installation Restoration Division Office (Building 67, Room 238, MCB, Camp Lejeune). Also, all addresses on the OU No. 11 mailing list were sent a copy of the Final PRAP and Fact Sheet. The notice of availability of the PRAP and RI document was published in the "Jacksonville Daily News" on February 2, 1997. A public comment period was held from February 5 to March 7, 1997. In addition, a public meeting was held on February 5, 1997 to respond to questions and to accept public comments on the PRAP for OU No. 11. The public meeting minutes were transcribed and a copy of the transcript is available to the public at the aforementioned locations. A Responsiveness Summary, included as part of this ROD, has been prepared to respond to the sigmficant comments, criticisms, and new relevant information received during the comment period. Upon signing this ROD, MCB, Camp Lejeune and the DoN will publish a notice of availability for the ROD in the local newspaper, and place this ROD the information repositories.

3.4 Scope and Role of the Response Action

The response action for Site 80 was developed to address site conditions that appear to be protective of human health and the environment. (Site conditions appear to be protective based on the results of the human health and ecological RAs conducted during the RI.) As a result, the only response action identified and evaluated for Site 80 is the "no action" plan. [Note: Section 2.4 of this ROD presents the response action developed for Site 7; and Section 4.0 presents the response action developed for OU No. 11.]

3.5 Summary of Site Characteristics

Site 80 exhibited the following site characteristics, as determined during the RI:

- Concentrations of VOCs detected in the surface and subsurface soil samples (including acetone and carbon disulfide) were less than 10 times the concentrations detected in quality control samples. Therefore, it is believed that the presence of these contaminants is not due to past activities at the site.

- PAHs were infrequently detected in the surface soil at concentrations less than 100 Ig/kg. The location of most of the PAH detections and the highest PAH concentrations were located in the soil mound in the northeast area of the site. This location is near the open area where burning operations of wood and leaves occur; burning may be the source of this contamination. Phenanthrene was the only PAH detected in the subsurface soil (53J Ig/kg) at a depth of 5 to 7 feet.

- Pesticides were the most frequently detected contaminants in the surface soil at Site 80. They exhibited the highest concentration ranges of all soil contaminants. Pesticides were detected in 20 of 55 surface soil samples. Pesticides detected in the surface soil included dieldrin, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, alpha-chlordane and gamma chlordane. Concentrations of pesticides ranged from 0.6J Ig/kg for 4,4'-DDE in sample 80-OA-SB04-00 to 260,000 Ig/kg for 4,4'-DDD in sample 80-DPA-SB03-00. The highest pesticide levels were detected in the west/northwest portion of the site. Additionally, elevated levels of pesticides were detected in the lawn area near the soil mounds. Pesticide levels in this area were one to three orders of magnitude lower than in the west/northwest area. Pesticides at other locations of the site were four orders of magnitude lower than in the west/northwest area. Pesticide concentrations at this site were higher than what is normally attributed to past historical pest control applications at MCB, Camp Lejeune.

- Pesticides were also the predominant contaminants in the subsurface soil at Site 80. However, concentrations were one to two orders of magnitude less than concentrations in the surface soil, The highest subsurface pesticide contaminant levels were detected in the west/northwest portion of the site. 4,4'-DDD was the most frequently detected pesticide (12 of 45 samples) and exhibited the highest concentration (510J Ig/kg) at a depth of 11 to 13 feet at soil boring location 80-MW04. The maximum concentration of 4,4'-DDT (240 Ig/kg) was detected at 11 to 13 feet at soil boring location 80-MW04.

- Inorganic contaminant levels detected in the surface soil were within one order of magnitude (or less) of Base background concentrations. The inorganics arsenic, barium, chromium, manganese, mercury, and selemum exhibited concentrations above Base background levels for inorganics in the subsurface soil.

- Carbon disulfide was the only VOC detected in groundwater. Its concentration, 1J Ig/L, was well below the state standard of 700 Ig/L.

- SVOCs were detected at low levels in a limited number of shallow monitoring wells. The SVOCs included acenaphthene, fluorene, carbazole, and pyrene. The maximum concentration of acenaphthene (4J Ig/L) and pyrene (1 Ig/L) did not exceed the state standards of 80 Ig/L and 210 Ig/L, respectively. Fluorene was detected at a concentration (3J Ig/L) well below its state standard (280 Ig/L).

- The pesticides 4,4'-DDD and 4,4'-DDT were detected in monitoring well 80-MW04 at concentrations of 2.2J Ig/L and 0.58 Ig/L, respectively. Federal and/or state groundwater standards have not been adopted for these pesticides.

- Two groundwater sampling rounds were conducted for inorganics analyses. During the first sampling round, concentrations of total inorganics the groundwater were within one order of magnitude or less of the dissolved inorganics concentrations. Aluminum, arsenic, chromium, iron, lead, and manganese were detected at concentrations exceeding their respective federal and/or state standards during the first sampling round. Nickel and thallium were the only inorganics detected in excess of their federal and/or state standards during the second sampling round. Total inorganics concentrations in the shallow groundwater were within the range of inorganics concentrations typically detected at MCB, Camp Lejeune.

3.6 Summary of Site Risks

As part of the RI, a human health RA and an ecological RA were conducted to determine the potential risks associated with the chemical constituents detected at Site 80. The following subsections briefly summarize the findings of these RAs.

3.6.1 Human Health Risk Assessment

During the human health RA, COPCs were selected for surface soil, subsurface soil, and groundwater, as shown in Table 13. The selection of COPCs was based on criteria provided in the USEPA Risk Assessment Guidance for Superfund.

For each COPC, ICR and HI values were calculated to quantify potential carcinogenic and noncarcinogenic risks, respectively. Table 14 presents these ICR and HI values for each environmental medium and receptor. (Receptors included current civilian adult base personnel, future residential children and adults, and future construction workers.) Table 14 also presents total ICR and HI values, which represent risks to all environmental media combined, for each receptor.

Shaded blocks in Table 14 indicate an ICR value that exceeds the USEPA acceptable limit of 1E-04, or an HI value that exceeds the USEPA acceptable limit of 1.0. As shown, unacceptable risk values include: the ICR for current adult base personnel exposed to soil (1.7E-04); the HI for future child residents exposed to soil (1.9); the ICR for future child residents exposed to groundwater (8E-04); the HI for future child residents exposed to groundwater (26.09); the ICR for future adult residents exposed to groundwater (1.7E-03); and the HI for future adult residents exposed to groundwater (11.04). Although these values exceed acceptable limits, the

risk they represent appears to be minimal for the following reasons:

Current Civilian Adult Base Personnel: Soil ICR = 1.7E-04

Pesticides and inorganics in surface soil (including dieldrin, 4,4'-DDD, and arsenic) were the main contributors to the unacceptable ICR value of 1.7E-04. However, a Time-Critical Removal Action was conducted for pesticide and arsenic contaminated surface soil at Site 80. Under the removal action, the contaminated surface soil was excavated, removed from the site, and sent to a disposal facility. The removal of this soil reduces the ICR value to below the acceptable limit of 1E-04 thereby eliminating the unacceptable carcinogenic risk associated with soil exposure.

Future Residential Child: Soil HI = 1.9

Pesticides and inorganics in surface soil (including dieldrin, 4,4'-DDT, and arsenic) were the main contributors to the unacceptable HI value of 1.9. However, a Time-Critical Removal Action was conducted for pesticide and arsenic contaminated surface soil at Site 80. Under the removal action, the contaminated surface soil was excavated, removed from the site, and sent to a disposal facility. The removal of this soil reduces the HI value to below the acceptable limit of 1.0 thereby eliminating the unacceptable noncarcinogenic risk associated with soil exposure.

Future Residential Child: Groundwater ICR = 8.0E-04

The ICR value of 8.0E-04 only slightly exceeds the acceptable limit of 1E-04, thus indicating only a slight potential for risk. In addition, the main contributor to this ICR value was arsenic which accounted for approximately 96 percent of the risk. However, arsenic was only detected in one monitoring well at a concentration that exceeded the state and federal standard. (In well 80-MW03, arsenic was detected at 102 Ig/L which exceeds the state and federal standard of 50 Ig/L. The ICR value of 8.0E-04 was generated using this 102 Ig/L detection level.) Upon resampling this well using a low flow peristaltic pump, arsenic was detected at a concentration (42 Ig/L) that did not exceed the state and federal standard. The well was observed to have poor groundwater recharge, samples collected from the well were silty, and the total suspended solids reading for water from the well was relatively high (21 Ig/L. As a result, it appears as though high arsenic concentrations at well 80-MW03 were the result of suspended solids in the well water rather than a site-related arsenic source. The risk associated with arsenic in groundwater appears to be an overestimate of the risk that actually exists at Site 80. In addition, the Time-Critical Removal Action prohibits arsenic contaminated surface soil from being a future potential source of groundwater contamination.

Future Residential Child: Groundwater HI = 26.09

The main contributor to this HI value of 26.09 is arsenic which accounts for approximately 66 percent of the risk. However, arsenic was only detected in one monitoring well at a concentration that exceeded the state and federal standard. (In well 80-MW03, arsenic was detected at 102 Ig/L which exceeds the state and federal standard of 50 Ig/L. The HI value of 26.09 was generated using this 102 Ig/L detection level.) Upon resampling this well using a low flow peristaltic pump, arsenic was detected at a concentration (42 Ig/L) that did not exceed the state and federal standard. The well was observed to have poor groundwater recharge, samples collected from the well were silty, and the total suspended solids reading for water from the well was relatively high (21 Ig/L). As a result, it appears as though high arsenic concentrations at well 80-MW03 were the result of suspended solids in the well water rather than a site-related arsenic source. The risk associated with arsenic in groundwater appears to be an overestimate of the risk that actually exists at Site 80. In addition, the Time-Critical Removal Action prohibits arsenic contaminated surface soil from being a future potential source of groundwater contamination.

Future Residential Adult: Groundwater ICR = 1.7E-03

The risk associated with this unacceptable ICR value of 1.7E-03 appears to be insignificant for the same reasons identified for the groundwater ICR value of 8.0E-04. These reasons are: 1) 1.7E-03 only slightly exceeds the acceptable ICR limit of 1E-04, and 2) arsenic accounts for approximately 96 percent of this ICR value, but the risk associated with arsenic in groundwater appears to be an overestimate of the risk that actually exists at Site 80, In addition, the Time

Critical Removal Action prohibits arsenic contaminated surface soil from being a future potential source of groundwater contamination.

Future Residential Adult: Groundwater HI = 11.04

The risk associated with this unacceptable HI value of 11.04 appears to be insignificant for the same reason identified for the groundwater HI value of 26.09. Arsenic accounts for approximately 66 percent of the HI value, but the risk associated with arsenic in groundwater appears to be an overestimate of the risk that actually exists at Site 80. In addition, the Time Critical Removal Action prohibits arsenic contaminated surface soil from being a future potential source of groundwater contamination.

Although several risk values for Site 80 exceed USEPA acceptable limits, the risks they represent appear to be minimal. As a result, conditions at Site 80 may be considered protective of human health and the environment.

3.6.2 Ecological Risk Assessment

During the ecological RA, COPCs were selected for surface soil as shown in Table 15. Then, potential ecological risks associated with each COPC were evaluated. The following paragraphs present the conclusions made for terrestrial receptors at Site 80.

Terrestrial Receptors

The ecological RA indicated that pesticides located in grass covered areas could potentially decrease the terrestrial invertebrate and plant populations. Several samples contained pesticide concentrations exceeding the SSSVs by several orders of magnitude. In addition, pesticides in the grass covered areas exhibited high bioconcentration factor (BCF) values indicating that these pesticides may accumulate in species ingesting terrestrial invertebrates and plants. However, the Time-Critical Removal Action in which pesticide-contaminated surface soil was removed from the site alleviates the ecological risks associated with pesticides in surface soil.

Several constituents in gravel covered areas at Site 90 also exceeded SSSVs. However, the gravel covered areas have been disturbed by vehicle traffic and are not likely to support a significant terrestrial invertebrate population. With the exception of a few patches of grass, plants do not grow in these areas. Consequently, the potential ecological impacts associated with constituents in gravel covered areas are relatively insignificant.

The rabbit was the only species with a total QI value that exceeded the acceptable level of 1.0. However, the rabbit's QI (2.8) only slightly exceeds the acceptable level of 1.0. Thus, it appears as though there is a relatively low potential for adverse impacts to the rabbit population. In addition, much of the site is gravel covered which reduces the rabbit's potential habitat.

The conclusions of the ecological RA indicate that although several SSSVs were exceeded and the rabbit's QI exceeded the acceptable limit, ecological risks at Site 80 are minimal. Thus, conditions at Site 80 appear to be protective of the environment.

3.7 Selected Remedy

The selected remedy for Site 80 is the "no action" plan. As its name suggests, the "no action" plan involves taking no further action at Site 80. This includes conducting no further environmental investigations or sampling. The site and all environmental media located within the site will remain as they currently are. The "no action" plan is justifiable because, based on the human health and ecological RAs and the Time-Critical Removal Action, conditions at Site 80 appear to be protective of human health and the environment.

4.0 THE SELECTED REMEDY FOR OU NO. 11

The selected remedy for OU No. 11 is a combination of the two separate remedies selected for Sites 7 and 80. For both sites, the selected remedy is the "no action" plan. Consequently, the selected remedy for OU No. 11 is the "no action" plan.

The "no action" plan, as its name suggests, involves taking no further action at OU No. 11. This includes conducting no further environmental investigations or sampling. The operable unit, and all environmental media located within the operable unit, will remain as they currently are. The "no action" plan is justifiable because environmental conditions within OU No. 11 appear to be protective of human health and the environment.

5.0 STATUTORY DETERMINATIONS

A selected remedy should satisfy the statutory requirements of CERCLA Section 121 which include: (1) protect human health and the environment; (2) comply with applicable or relevant and appropriate requirements (ARARs); (3) achieve cost-effectiveness; (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element, or provide an explanation as to why this preference is not satisfied. The following paragraphs evaluate the selected remedy for OU No. 11 with respect to these requirements.

5.1 Protection of Human Health and the Environment

Based on the human health and ecological RAs conducted during the RI, conditions at Sites 7 and 80 appear to be protective of human health and the environment, both now and in the future.

Although unacceptable human health risks were generated for both Sites 7 and 80, these risks are considered to be overly conservative estimates of the risks that actually exist. Unacceptable risks to groundwater were generated under the future residential scenario at Site 7. However, this scenario is highly unlikely because the site mainly consists of a tidally influenced swamp area. There is also a potable water distribution system located at the Base that will likely be utilized, rather than on site groundwater source, in the event of future construction. Unacceptable risks to surface soil were generated under the current Base personnel and future residential scenarios at Site 80. However, the Time-Critical Removal Action for pesticide and arsenic contaminated surface soil was conducted to reduce this current risk to within acceptable limits. Unacceptable risks to groundwater were also generated under the future residential scenario at Site 80. However, the elevated inorganics levels contributing to these risks are believed to be the result of a poorly constructed well rather than a significant site-related problem. [Note: For a more comprehensive discussion of human health risks, refer to Sections 2.6.1 and 3.6.1 of this ROD.]

Unacceptable ecological risks were also generated for Sites 7 and 80. Like the unacceptable human health risks, the unacceptable ecological risks are considered to be overly conservative estimates of the risks that actually exist. At Site 7, several SWSVs, SSVs, and SSSVs were exceeded. However, the exceedences were minor, and/or total inorganics concentrations were used to determine the risks. QIs for cottontail rabbits, raccoons, and short-tailed shrews (5.13, 70.4, and 311, respectively) were also exceeded. However, aluminum (an elemental metal) was the main contributor to these risks, and the terrestrial intake model is known to be extremely conservative. At Site 80, several pesticides exceeded SSSVs. However, the Time-Critical Removal Action for pesticide and arsenic contaminated surface soil alleviates these exceedences. The QI for the rabbit (2.8) also exceeded the acceptable level of 1.0, but this exceedence was minor. [Note: For a more comprehensive discussion of ecological risks, refer to Sections 2.6.2 and 3.6.2 of this ROD.]

Based on the nature of the human health and ecological risks at Sites 7 and 80, conditions at OU No. 11 appear to be protective of human health and the environment, both now and in the future. Therefore, no remedial actions need to be implemented in order to maintain adequate protection. The "no action" plan is a justifiable, protective remedy.

5.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy will not comply with all of the chemical-specific ARARs that apply to Sites 7 and 80. Chemical constituents will remain untreated at levels exceeding state and federal standards. Tables 3 and 11 identify the constituents that will exceed chemical-specific ARARs at Sites 7 and 80, respectively. Despite these exceedences, the risks associated with these constituents will be minimal; leaving them untreated at the sites should not have any detrimental impacts on human health or the environment. A waiver of the chemical-specific ARARs,

however, may be required before the selected remedy can be implemented.

5.3 Cost-Effectiveness

There are no costs associated with the selected remedy for OU No. 11. The "no action" plan is cost effective since any other action would not provide significant, if any, benefits to public health or the environment.

5.4 Utilization of Permanent Solutions and Alternative Treatment Technologies

The selected remedy for OU No. 11 should be a permanent solution. Future risks at both Sites 7 and 80 are expected to be insignificant, so no further remedial actions will be necessary and the "no action" plan should be a permanent solution.

Alternative treatment technologies were not considered for OU No. 11 because conditions at Sites 7 and 80 appear to be protective of human health and the environment. Treatment technologies were not considered appropriate based on site conditions and potential risks to human health and the environment.

5.5 Preference for Treatment as a Principal Element

The selected remedy for OU No. 11 does not satisfy the statutory preference for treatment as a principal element. However, the remedy is still capable of providing adequate protection of human health and the environment.

6.0 RESPONSIVENESS SUMMARY

6.1 Overview

The selected remedy for OU No. 11 (Sites 7 and 80) is the "no action" plan. Based on the comments received during the public comment period, the public appears to support the selected remedy. In addition, the USEPA and the NC DEHNR are in support of the selected remedy outlined herein.

6.2 Background on Community Involvement

A record review of the MCB, Camp Lejeune files indicates that the community involvement centers mainly on a social nature, including the community outreach programs and Base/community clubs. The file search did not locate written Installation Restoration Program (IRP) concerns of the community. A review of historic newspaper articles indicated that the community is interested in the local drinking and groundwater quality, as well as that of the New River, but that there are no expressed interests or concerns specific to the environmental sites (including Sites 7 and 80). Two local environmental groups, the Stump Sound Environmental Advocates and the Southeastern Watermen's Association, have posed questions to the Base and local officials in the past regarding other environmental issues. These groups were sought as interview participants prior to the development of the Camp Lejeune, IRP, Community Relations Plan. Neither group was available for the interviews.

Community relations activities to date are summarized below:

- Conducted additional community relations interviews, February through March 1990. A total of 41 interviews were conducted with a wide range of persons including Base personnel, residents, local officials, and off-Base residents.
- Prepared a Community Relations Plan, September 1990.
- Conducted additional community relations interviews, August 1993. Nineteen persons were interviewed, representing local business, civic groups, on- and off-Base residents, military and civilian interests.
- Prepared a revised Final Draft Community Relations Plan, February 1994.
- Established two information repositories.

- Established the Administrative Record for all of the sites at the base.
- Formed Restoration Advisory Board (RAB) in May 1996.
- Released PRAP for public review in repositories, February 5, 1997.
- Released public notice announcing public comment and document availability of the PRAP, February 2, 1997.
- Held RAB meeting, February 5, 1997, to review PRAP and solicit comments.
- Held public meeting on February 5, 1997, to solicit comments and provide information. Approximately 10 people attended. The public meeting transcript is available in Appendix A of this ROD document, and in the repositories.

6.3 Summary of Comments Received During the Public Comment Period and Agency Responses

A public meeting was held on February 5, 1997 in the Onslow County Library in Jacksonville, North Carolina. Representatives from LANTDIV, MCB, Camp Lejeune, USEPA Region IV, NC DEHNR, OHM Corporation, and the RAB attended the meeting. The transcript for the public meeting is provided in Appendix A.

TABLE 1

SUMMARY OF THE ANALYTICAL RESULTS FOR SOIL
SITE INSPECTION, 1991
OPERABLE UNIT NO. 11 (SITE 7)
MCB CAMP LEJEUNE, NORTH CAROLINA

Constituent	Surface Soil (0-2 feet bgs)		Subsurface Soil (3-12 feet bgs)	
	No. of Detections/Total No. of Samples	Range of Detected Concentrations	No. of Detections/Total No. of Samples	Range of Detected Concentrations
Organics (1)				
Bis(2-ethythexyl)phthalate	1/8	1,000	0/5	ND
Fluoranthene	2/8	220-290	0/5	ND
Benzoic acid	2/8	6,300-15,000	1/5	7,900
Aldrin	1/8	4.3	0/5	ND
4,4'-DDD	3/8	12-20	2/5	58-190
4,4'-DDE	1/8	240	0/5	ND
Dieldrin	3/8	12-540	3/5	400-2,500
Endosulfan II	3/8	7.6-1,400	3/5	73-2,000
Endrin	2/8	91-140	4/5	14-1,300
Aroclor-1260	3/8	108-12,000	4/5	660-25,000
Inorganics (2)				
Aluminum	8/8	3,690-9,700	5/5	1,030-5,030
Arsenic	3/8	1.1-1.7	3/5	1.1-1.5
Barium	8/8	9.1-223	5/5	6.6-72.8
Beryllium	4/8	0.26-2.1	3/5	0.29-3.6
Cadmium	8/8	1.1-5.0	5/5	1.2-4.5
Calcium	7/8	190-58,200	3/5	3,660-9,990
Chromium (Total)	8/8	4.2-10.6	5/5	5.2-12.5
Cobalt	8/8	1.7-8.1	5/5	1.9-10.2
Iron	8/8	876-5,330	5/5	981-5,490
Lead	8/8	3.0-114	5/5	2.4-17.0
Magnesium	8/8	104-1,150	4/5	99.9-541
Manganese	8/8	3-2-69.0	5/5	3.0-47.7
Mercury	8/8	0.11-0.53	5/5	0.12-0.45

TABLE 1 (Continued)

SUMMARY OF THE ANALYTICAL RESULTS FOR SOIL
SITE INSPECTION, 1991
OPERABLE UNIT NO. 11 (SITE 7)
MCB CAMP LEJEUNE, NORTH CAROLINA

	Surface Soil (0-2 feet)		Subsurface Soil (3-12 feet)	
Constituent	No. of positive Detections/No. of Samples	Range of Positive Detections	No. of positive Detections/ No. of Samples	Range of Positive Detections
Nickel	8/8	2.8-13.1	5/5	3.1-11.7
Potassium	6/8	110-507	4/5	120-452
Selenium	1/8	0.54	0/5	ND
Silver	8/8	0.66-3.0	5/5	0.72-2.7
Sodium	1/8	754	1/5	1,020
Thallium	8/8	0.44-2.0	5/5	0.47-1.8
Vanadium	8/8	4.5-18.1	5/5	4.5-9.8
Zinc	2/8	1.1-44.5	3/5	1.2-4.5
Cyanide	8/8	0.54-2.5	5/5	0.60-2.3

Notes:

(1) Organic concentrations expressed in Ig/kg (microgram per kilogram).
(2) Inorganic concentrations expressed mg/kg (milligram per kilogram).
bgs = Below ground surface.
ND = Not detected.

Reference: Halliburton/NUS, 1991. Site Inspection Report for Site 7 Tarawa Terrace Dump. Marine Corps Base, Camp Lejeune, North Carolina.

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<IMG SRC 98019O>
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TABLE 3 (Continued)

SUMMARY OF THE ANALYTICAL RESULTS
REMEDIAL INVESTIGATION, 1994-95
OPERABLE UNIT NO. 11 (SITE 7)
MCB, CAMP LEJEUNE, NORTH CAROLINA

Notes:

(1) Detections compared to maximum base background concentrations.
(2) 1994 Proposed rule for Disinfectants and Disinfectant By-Products: Total for all Trihalomethanes cannot exceed the 80 parts per billion (ppb) level.
(3) SCML = Secondary Maximum Contaminant Level (not enforced).
(4) Action Level.
(5) Shaded blocks indicate detections above comparison criteria

NE = No Criteria Established
NA = Not Applicable
NJ = Estimated/tentative value
J = Estimated value
RBC = Region III Risk Based Concentration
SSL = Region III Soil Screening Level for the Protection of Groundwater
MCL = Federal Maximum Contaminant Level
NCWQS = North Carolina Water Quality Standard
AWQC = Ambient Water Quality Standard
Ig/L = microgram per liter (ppb)
Ig/kg = microgram per kilogram (ppb)
mg/kg = milligram per kilogram (parts per million [ppm])
NOAA ER-L = National Oceanic Atmospheric Administration Effective Range - Low
NOAA ER-M = National Oceanic Atmospheric Administration Effective Range -Median
-- = Undefined

Reference: Baker Environmental, Inc., 1996. Remedial Investigation Report Operable Unit No. 11 (Site 7). Marine Corps Base, Camp Lejeune, North Carolina.

TABLE 4

INORGANICS IN GROUNDWATER - ROUNDS ONE, TWO, AND THREE
REMEDIAL INVESTIGATION, 1994-96
OPERABLE UNIT NO. 11 (SITE 7)
MCB CAMP LEJEUNE, NORTH CAROLINA

Inorganic	NCWQS	MCL	TW01-01	TW01-02	TW01-03	TW03-01	TW03-02	TW03-03	MW03-01	MW03-02	MW03-03
Aluminum	NE	50-200	15,600	959	2,660	17,800	3,980	1,460	88,000	927	739
Barium	2,000	2,000	225	51	44.7	142	58	44.8	370	10.3	9.9
Beryllium	NE	4	1.2	ND	ND	3	ND	ND	1.6	ND	ND
Chromium	50	100	17.1	ND	ND	11.7	4	ND	104	ND	ND
Copper	1,000	1,300	10.6	3.8	1.9	ND	2.7	ND	20.8	4.4	ND
Iron	300	300	8,330	3,390	2,870	6,200	4,140	3,330	25,400	2,680	2,230
Manganese	50	50	42.4	38	38.4	18.4	15	11.6	13000	3.3	2.3
Lead	15	15	41.6	1.4	10.6	27.1	7.9	3.4	67.5	1.3	ND
Zinc	2,100	5,000	ND	7.2	7.4	167	6.6	7.1	180	ND	1.4

Notes:

(1) Concentrations are reported in micrograms per liter (Ig/L).
(2) Shading indicates an exceedance of the state and/or federal standard.

-01 = Round One
-02 = Round Two
-03 = Round Three
ND = Not Detected
NE = No Criteria Established
MCL = Maximum Contaminant Level
NCWQS = North Carolina Water Quality Standard

TABLE 5

CONTAMINANTS OF POTENTIAL CONCERN (COPCs)
EVALUATED DURING THE HUMAN HEALTH RISK ASSESSMENT
OPERABLE UNIT NO. 11 (SITE 7)
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant	Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment
Volatiles					
Chloroform					
2-Butanone				X	X
2-Hexanone				X	
Toluene					X
Styrene					X
Xylenes(Total)				X	
Semivolatiles					
Phenol					
4-Methylphenol					
Acenaphthylene					X
Dibenzofuran					X
Phenanthrene					X
Anthracene					X
Di-n-butylphthalate					X
Fluoranthene					X
Pyrene					X
Butylbenzylphthalate					X
3,3-Dichlorobenzidine					X
Benzo(a)anthracene					X
Chrysene					X
bis(2-Ethylhexyl)phthalate				X	X
Di-n-octylphthalate					X
Benzo(b)fluoranthene					X
Benzo(k)fluoranthene					X
Benzo(a)pyrene	X				X
Indeno(1,2,3-cd)pyrene					X
Benzo(g,h,i)perylene					X
Pesticide/PCBs					
delta-BHC					
Aldrin					X
Dieldrin	X	X	X	X	X
4,4'-DDE					X
4,4'-DDD					X
4,4'-DDT					X
Endrin ketone				X	X
alpha-Chlordane					X
gamma-Chlordane					X

TABLE 5(continued)

CONTAMINANTS OF POTENTIAL CONCERN (COPCs)
EVALUATED DURING THE HUMAN HEALTH RISK ASSESSMENT
OPERABLE UNIT NO. 11 (SITE 7)
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant	Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment
Aroclor-1260					X
Inorganics					
Aluminun	X	X	X		
Arsenic	X	X			X
Barium			X	X	X
Beryllium	X	X	X		X
Calcium					
Chromium			X		X
Copper				X	X
Iron					
Lead	X		X	X	X
Magnesium					
Manganese			X	X	X
mercury					X
Potassium					
Selenium					X
Silver				X	
Sodium					
Thallium					X
Vanadium			X		X
Zinc				X	X

X = Selected as a COPC for human health risk assessment.
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TABLE 7

CONTAMINANTS OF POTENTIAL CONCERN (COPCs)
EVALUATED DURING THE ECOLOGICAL RISK ASSESSMENT
OPERABLE UNIT NO. 11 (SITE 7)
MCB CAMP LEJEUNE, NORTH CAROLINA

	Freshwater Stations			Saltwater Stations			
	Surface Water			Surface Water			
Contaminant	Aquatic Receptors	Terrestrial Receptors	Sediment	Aquatic Receptors	Terrestrial Receptors	Sediment	Surface Soil
Inorganics							
Aluminum	X	X	X	X	X		X
Arsenic							X
Barium	X	X		X	X		X
Beryllium			X			X	X
Chromium							X
Cobalt							X
Copper			X	X	X		
Iron	X	X		X	X		X
Lead	X	X	X	X	X	X	X
Manganese		X		X	X		X
Mercury			X				X
Nickel							X
Selenium						X	
Silver							
Thallium						X	
Vanadium			X			X	X
Zinc	X	X	X		X		X
Volatiles							
2-Butanone				X	X	X	
2-Hexanone				X	X		
Styrene			X				
Toluene			X				X
Xylenes					X		
Semivolatiles							
Acenaphthylene			X				
Anthracene			X				
Benzo(a)anthracene							X
Benzo(b)fluoranthene							X
Benzo(k)fluoranthene							X
Benzo(g,h,i)perylene							X

TABLE 7(continued)

CONTAMINANTS OF POTENTIAL CONCERN (COPCs)
EVALUATED DURING THE ECOLOGICAL RISK ASSESSMENT
OPERABLE UNIT NO. 11 (SITE 7)
MCB CAMP LEJEUNE, NORTH CAROLINA

	Freshwater Stations			Saltwater Stations			
	Surface Water			Surface Water			
Contaminant	Aquatic Receptors	Terrestrial Receptors	Sediment	Aquatic Receptors	Terrestrial Receptors	Sediment	Surface Soil
Benzo(a)pyrene							X
Bis(2-ethylhexyl)phthalate			X		X		X
Chrysene							X
Di-n-butylphthalate			X				X
3,3'Dichlorobenzidine			X				
Fluoranthene							X
Indeno(1,2,3-cd) pyrene							X
Phenanthrene			X				X
Pyrene							X
Pesticides/PCBs							
Aldrin			X				
Alpha-chlordane			X			X	X
Gamma-chlordane			X			X	X
4,4'-DDE			X			X	X
4,4'-DDD			X			X	X
4,4'-DDT			X			X	X
Dieldrin	X	X	X			X	X
Endosulfan II							X
Endrin ketone	X	X	X				
Aroclor-1254							X
Aroclor-1260			X				X

Notes:

X = Indicates contaminant of potential concern

TABLE 8

SUMMARY OF THE ANALYTICAL RESULTS FOR SOIL
SITE INSPECTION, 1991
OPERABLE UNIT NO. 11 (SITE 80)
MCB CAMP LEJEUNE, NORTH CAROLINA

	Surface Soil (0-6 inches bgs)		Near Subsurface Soil (0-2 feet bgs)		Subsurface Soil (3-17 feet bgs)	
Constituent	No. of Positive Detections/ No. of Samples	Range of Positive Detections	No. of Positive Detections/ No. of Samples	Range of positive Detections	No. of Positive Detections/ No. of Samples	Range of Positive Detections
Methylene Chloride	1/3	7	0/7	ND	0/7	ND
Aldrin	0/3	ND	1/7	6.8-220	0/7	ND
alpha-Chlordane	0/3	ND	1/7	60	0/7	ND
4,4'-DDD	1/3	18	3/7	20-700	0/7	ND
4,4'-DDE	0/3	ND	5/7	16-210	0/7	ND
4,4'-DDT	0/3	ND	4/7	15-290	0/7	ND
Dieldrin	0/3	ND	4/7	16-440	0/7	ND
Aroclor-1254	0/3	ND	2/7	830-1,500	0/7	ND

Notes:

Concentrations expressed in Ig/kg (microgram per kilogram)
ND = Not detected.
bgs= Below ground surface.

Reference: Halliburton/NUS, 1991. Site Inspection Report for Site 80 Paradise Point Golf Course. Marine Corps Base, Camp Lejeune, North Carolina.

TABLE 9

SUMMARY OF THE ANALYTICAL RESULTS FOR GROUNDWATER
SITE INSPECTION, 1991
OPERABLE UNIT NO. 11 (SITE 80)
MCB CAMP LEJEUNE, NORTH CAROLINA

Constituent	North Carolina Standards	USEPA MCLs	No. of Positive Detections/ No. of Samples	Range of Positive Detections	Location of Maximum Concentration
Toluene	1,000	1,000	1/3	180	80MW03
Ethylbenzene	29	700	1/3	5	80MW03
Xylenes	400	10,000	1/3	21	80MW03
Carbon Disuffide	--	--	1/3	25	80MW03

Notes:

Concentrations expressed in Ig/L (microgram per liter)
USEPA = U.S. Environmental Protection Agency
MCL = Federal Maximum Contaminant Level
-- = Criteria not established.

Reference: Halliburton/NUS, 1991. Site Inpection Report for Site 80 Paradise Point Golf course. Marine Corps Base, Camp Lejeune, North Carolina.

TABLE 10

SUMMARY OF THE ANALYTICAL RESULTS FOR SURFACE WATER
SITE INSPECTION, 1991
OPERABLE UNIT NO. 11 (SITE 80)
MCB CAMP LEJEUNE, NORTH CAROLINA

Near Site (80-SWO3, 80-SW04, 80-SW05)

Constituent	No. of Positive Detections/ No. of Samples	Range of Positive Detections
Acetone	3/3	11-190
Toluene	2/3	30-104
Carbon Disulfide	1/3	6
Total Petroleum Hydrocarbons	2/3	1390-1660

Notes:

Concentrations expressed in Ig/L (microgram per liter)

Reference: Halliburton/NUS, 1991. Site Inspection Report for Site 80 Paradise Point Golf Course. Marine Corps Base, Camp Lejeune, North Carolina.

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TABLE 12

REMEDIATION LEVELS FOR THE TIME-CRITICAL REMOVAL ACTION
OPERABLE UNIT NO. 11 (SITE 80)
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Concern	Remediation Level micrograms per kilogram (Ig/kg)
Aldrin	340
Dieldrin	360
4,4'-DDD	2,400
4,4'-DDT	1,700
alpha-Chlordane	4,400
gamma-Chlordane	4,400

TABLE 13

CONTAMINANTS OF POTENTIAL CONCERN (COPCs)
EVALUATED DURING THE HUMAN HEALTH RISK ASSESSMENT
OPERABLE UNIT NO. 11 (SITE 80)
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Potential Concern	Surface Soil	Subsurface Soil	Groundwater
Volatiles			
Carbon disulfide			
Semivolatiles			
Acenaphthene			
Dibenzofuran			
Fluorene			
Carbazole			
Pyrene			
Bis(2-ethylhexyl)phthalate			X
Di-n-octylphthalate			
Pesticide/PCBs			
Aldrin	X		
Dieldren	X		
4,4'-DDD	X		X
4,4'-DDT	X		X
Alpha-Chlordane	X		
Gamma-Chlordane	X		
Inorganics			
Aluminum	X		X
Arsenic	X	X	X
Barium	X		
Beryllium			X
Calcium			
Chromium			X
Copper			
Iron			
Lead		X	X
Magnesium			
Manganese	X		X
Mercury	X		
Nickel			
Potassium			
Sodium			
Vanadium			X
Zinc			

Notes:

X = Selected as a COPC for human health risk assessment.
Reference: Baker Environmental, Inc., 1996. Remedial Investigation Report Operable Unit No. 11 (Site 80). Marine Corps Base, Camp Lejeune, North Carolina.
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TABLE 15

CONTAMINANTS OF POTENTIAL CONCERN (COPCs)
EVALUATED DURING THE ECOLOGICAL RISK ASSESSMENT
OPERABLE UNIT NO. 11 (SITE 80)
MCB CAMP LEJEUNE, NORTH CAROLINA

Contaminant of Potential Concern in Surface Soil
Inorganics
Aluminum
Arsenic
Barium
Beryllium
Cadmium
Chromium
Copper
Iron
Lead
Manganese
Mercury
Nickel
Selenium
Silver
Vanadium
Zinc
Semivolatiles
Benzo(b)fluoranthene
Bis(2-ethylhexyl)phthalate
Chyrsene
Di-n-butylphthalate
Pyrene
Pesticides
Aldrin
Alpha-chlordane
Gamma-chlordane
4,4'-DDE
4,4'-DDD
4,4'-DDT
Dieldrin

FIGURES

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APPENDIX A
PUBLIC MEETING TRANSCRIPT

RESTORATION ADVISORY BOARD MEETING

Remedial Action Plan for

Operable Unit 11, Sites 7 & 80

February 5, 1997.
Tarawa Terrace I
Elementary School,
Jacksonville, North Carolina

Reported by:

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* COPY *

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WEDNESDAY EVENING SESSION

February 5, 1997

The Meeting of the Restoration Advisory Board of Marine Corps Base, Camp Lejeune, Jacksonville, North Carolina convened at 7:50 o'clock p.m. in the Dining Hall of Tarawa Terrace I Elementary School.

MR. MATT BARTMAN: Okay, let's get going.

[Whereupon Mr. Bartman then supplemented his presentation with the use of colored slides.]

MS. TOWNSEND: Focus?

MR. BARTMAN: Focus - I think it's your eyes, Gina. It looks fine to me.

But, my contacts are getting bad though.

Stop me at any time. Ask me any questions.

I don't know if I'll answer them, but you can ask them!

Okay, what we're going to be talking about right here is Operable Unit 11 which consists of two sites, Site 7 and Site 80.

Site 7 is known as the Tarawa Terrace Dump.

Site 80 is the Paradise Point Golf Course Maintenance Area, which is my favorite site. I wish I

could've gotten a chance to play there while we were investigating this site.

MR. SWARTZENBERG: Is that the one with the chemicals?

MR. BARTMAN: Chemicals?

MR. SWARTZENBERG: The area where they were mixing the pesticides?

MR. BARTMAN: Yes, the pesticide mixing area.

This slide is difficult to view and I apologize for that.

But, Site 7, I guess as you're sitting in this classroom you're pretty close to Site 7. It's within the Tarawa Terrace Housing Complex.

It's right off Highway 24. However, you'd be better off entering Tarawa Terrace II entrance and that would bring you to Site 7.

Site 80 is what I refer to as the main side of the Base and if you were to come through the guard gate, make your first right, go down Brewster Boulevard to the very end, you'd run into the golf course and the maintenance area within the golf course proper.

What I'd like to talk about is basically I break

these talks down into four different categories:

Where the sites are, a little bit of description of them.

Remedial investigation - what did Baker do out there.

Some of the findings.

What are the risks at the site.

And, then what are we going to do about those risks, if there are any.

Again, Site 7 is located a quarter-mile south of the Tarawa Terrace Housing Complex which we're all sitting in right now.

It's bordered to the northwest by the Tarawa Terrace Housing Community.

Bordered to the northeast by the Tarawa Terrace Community Center.

It's bordered in the southwest by the Tarawa Terrace Waste Water Treatment Plant.

And, to the southeast by Northeast Creek.

In fact, in the area of Northeast Creek, it's a complete marsh area so as you're walking onto the site and try to get to Northeast Creek, you're going to find

yourself waist deep in muck.

The use of operation of the dump are unknown. However, we do know that it was closed in 1972.

And, if you do some site reconaissance or walk around the site, you'll see discarded paint cans, discarded oil cans.

It's not unsightly, but you can see remnants of a lot of what I would call housing debris.

The site is heavily wooded and like I said, there's a marsh area in the area of Northeast Creek.

Within the site, there are two unnamed tributaries which flow in the direction of Northeast Creek and basically these receive surface water runoff from the housing community and drain away into Northeast Creek.

These sites, I apologize these don't really tell you much about the site, but I guess you can see it's heavily wooded.

That is a utility right-of-way that's cut right through the site and everything to the right is really where the site is located.

So, you can see that during our investigation we had some difficult things to do with clearing trees to be

able to get drill rigs in there and do soil borings.

We did test pits in there because of potential buried debris and different things of potential buried drums.

So, again, we had a lot of access problems to the site.

This is the community center and in the rear of the swing set you drop down I guess a fairly steep hill to the site, so even though there's access from the community center to the site, it's not something that a child would readily want to do, but it can be done.

Site 80, again it's located northwest of Brewster Boulevard within the Paradise Point Golf Course area.

I couldn't tell you which hole it's located off of, but it's a one acre site. It has maintenance buildings.

There's a wash pad there and I can't remember whether during your site tour you even viewed this area, but I'm sure Tom took you there.

The northeast portion of the site contains large soil mounds.

I'm just going to flip to the view of the site.

There's old maintenance equipment scattered throughout the site and there's this building.

This building here I believe is where they keep like all the fertilizers and the pesticides and different things and there's a building in the rear of this one where they do all the maintenance on all the golf course equipment.

This is a road that leads off of that golf course maintenance building all the way back.

And, this road comes back to the original area where we thought our problem was going to be.

Look at the soil mounds in the rear of that road.

And, the history goes back that those soil mounds were created when they dug out the irrigation ponds for the golf course, they deposited soil there.

Now, the soil wasn't the problem, but they were going to use this soil for a bar pit to build up the golf course at later times.

Well, someone said that there were solvents dumped in these soil mounds and not to use the soil

because it was contaminated.

So this is where we thought our initial problem was going to be.

But, as it turned out, this wasn't the problem at all.

The golf course was constructed in 1940, but this maintenance area started in 1946 and, as we know, it's still in operation.

So, what did we do?

Well, there were site inspections conducted by another subcontracting firm in 1991 and what they found were some pesticides in the soil at Site 7.

So, that rolled in the remedial investigation phase which we commenced in October of 1994.

And, as part of this investigation, we did surface to subsurface investigations.

We did groundwater investigations.

And, at Site 7, we did a surface water sediment investigation and an ecological investigation.

At Site 80, this wasn't necessary because there wasn't a surface water body to investigate.

It looks like it took a long time to do all this

sampling because, you know, we concluded our investigation in October of '96.

Actually, we concluded in November of '94 but because of some inconsistencies and some data gaps, we had to come back out for different sampling rounds at Site 7 to prove that our groundwater really wasn't impacted with metals.

So, really, all the investigation procedures concluded in October of '96.

But, we were not out in the field for two years, thank God.

So, what did we find?

At Site 7, we have low concentrations and infrequent detections of organic contaminants in the surface and subsurface, nothing to really write home about.

In groundwater, we have organic contaminants and frequently detected.

The inorganic-contaminants are below State and Federal standards.

However, this is why we had to continue to come back out to Site 7 and do three rounds of groundwater

sampling on three wells.

The initial round of sampling, we had high levels of lead, I believe manganese, iron and aluminum which were above State standards.

So, the State recommended that we go out and re-sample these points.

Two of the points were what we called temporary wells, wells you just put into the ground, take a sample and pull out.

Well, we left the wells in place.

The other well was in that marsh area and you can literally go down to that well and grab it by the well casing and move the well like this.

So, what does that tell us?

Well, it probably tells us that they're highly turbid samples, there's a lot of sediment involved in the groundwater sample that we're collecting and that that sample probably isn't truly representative of the water.

It's probably representative more of the sediment that's in the water.

So, in those two additional rounds of sampling that we did, we used a different sampling technique where

we used low flow purge sampling to get a more representative sample of the groundwater and less of the sediment.

There's less disturbance, less turbidity in the sample.

And, from those three rounds, we show that the only inorganics that remain above State standards are iron and aluminum which aluminum really, as far as the Federal, it's a secondary MCL which means it's really for aesthetics, it's not because it creates a problem.

As far as surface water, we have metals - arsenic, lead and manganese, which are above criteria.

Again, lead and manganese, especially manganese all over this Base is above criteria in groundwater, so obviously in surface water we should also see a problem.

In sediments we have pesticides above criteria and I'm assuming that the pesticides in the sediment are due to the overlay and runoff draining into these surface water bodies depositing in the sediment and just from the overall applications across the Base from many years of use of pesticides.

From a risk assessment standpoint, we looked at

current and future residential children, current and future residential adults and future construction workers.

This is one of the few sites where we've had to really look at current residents, but with the Tarawa Terrace Housing Community, how can you not look at current residents?

Well, what we found is that there were no risks to current children.

No risk to current adults.

And, for future residents, we had a non-carcinogenic risk.

And, again, that was based from the ingestion of aluminum in groundwater.

And, for the future construction worker, there were no risks estimated.

What did we do at Site 80?

We did both soil and groundwater sampling at Site 80.

Again, we had no surface water or sediment to investigate.

There were elevated levels and frequent detections of pesticides in the surface soil.

In the groundwater, we had low levels of organics and metals.

I made a little bit of an error here.

The soil at Site 80, we might have had infrequent detections, but in one concentrated area we have a lot of pesticides.

And, what we'll lead into and I'll talk about the remedial alternative, it's in that particular area where we had elevated levels of pesticides, that problem had to be taken care of immediately.

And, what you'll see is the receptors that we looked at and discussed were future adults and child residents, future construction workers and current civilian adult Base personnel.

One thing you'll see are current civilian Base adult personnel are the people that work there.

We had to evaluate them from a risk standpoint.

You don't see the current adult and children because no one lives in this area.

And, future construction workers, that's something that's always possible.

The risks to current adult Base personnel, we

had an unacceptable carcinogenic risk there and that was mainly due to the elevated levels of pesticides in the soil which leads us to this:

For site 7, if you remember to go back, we had no unacceptable risks.

Low levels of contamination that really didn't cause risks.

So, our proposal here is for no further action.

For Site 80, we have to use institutional controls which include the Off for Use restrictions and the only reason that is because we do have arsenic in the groundwater, both in rounds one and the second round of sampling that indicates there's a potential carcinogenic risk from the ingestion of groundwater.

MS. WOOD: What did they use the arsenic for?

MR. BARTMAN: Arsenic's often associated with pesticide use with pesticides.

It's--I wouldn't say it's used-

MS. WOOD: I always think--

MR. BARTMAN: I'm sorry.

MS. WOOD: I think of rat poison with arsenic.

MR. BARTMAN: Well, it's a poison and so in

pesticides it's also used to, say to cut the pesticides, but it's also inorganic.

I used the word "cut" but I'm trying to like figure--

MS. WOOD: I understand what you mean, yes.

MR. BARTMAN: --In the manufacturing of pesticides, you find that particular metal associated with pesticide use.

So, what we had to do for Site 80 because we demonstrated there was a current risk to the current civilian adult Base personnel was come up with what is known as a time critical removal action for pesticide contaminated soil.

And, basically, a time critical removal action is an overriding mandate to protect human health.

We need to initiate action within six months and usually these removal actions are low cost, small volumes and there's very few options for the remedial alternative you're going to take.

You kind of know that it's - I call it this. Jim may call it something else - a dig in a hole.

You go in, you take the soil, you dig it up and

you remove it, which is what we basically did in this case.

There is the need to go through many alternative decisions and screenings and evaluations to kind of know what you're going to do.

And, it's basically driven by the potential risk to a receptor like right now, the immediate need.

And, the only reason--go ahead!

MR. CALLAWAY: The removal of the soil, where was it taken?

MR. BARTMAN: I'll let Jim give you that, yeah.

The lack of action for a time critical removal action.

The only reason that this could be stopped if there's a lack of money availability, budgets, or lack of contract mechanisms to implement the time critical removal action.

So, what I'd like to do is - that's a short synopsis on what a time critical removal action is and this partnering team was able to implement this I believe within - we had the design ready to go to remove this soil in less than four months, review and then in less than

eight months, OHM was out there remediating this soil.

This may sound like a long time to you, but to me, that's very quick to have findings, a plan of action, a design and implementation in less than a year.

MR. HUMPHRIES: They were doing that when we visited the site. It's all done now, right?

MR. BARTMAN: It is done.

OHM - Jim was the Project Manager that handled the removal of the soil.

We found it. He removed it.

And, that's our jobs.

So, I'm going to let Jim handle this right now, if you don't mind, about how much was removed, how it was removed and where did it go to.

MR. DUNN: Just as a little refresher.

[Whereupon Mr. Dunn then supplemented his presentation with the use of overhead projected transparencies.]

The golf course - this is Brewster Road and the golf course is basically in there.

This is the entire golf course right in this area. This is the area that was remediated was Site A.

This is the large metal building that Matt had a picture of.

This is the maintenance area behind it.

When Baker went out and did this sampling, they had several hits over here of pesticides.

In these areas, they were sporadic, one hit out of several samples. Of course, that single sample taken was hot.

Knowing that they were going to go into time critical removal action, rather than spend time and money doing a bunch of sampling, the sampling task came over to us together with the removal.

We got these drawings from Baker.

They estimated that these were the areas that would need remediation.

The first thing we did was grid these areas and using an on-site GC determined where we had pesticides that required removal.

Each of these squares is a ten-by-ten grid.

The original areas - this is one, the big original area with the trailer getting expanded in this direction.

We knew this was all hot, so it all was remediated.

As we started our laboratory analyses, we set up this grid which then expanded in all directions until every one of these outer squares ended up being cleaned.

Remember, there were three over here?

Well, we ended up - the whites were clean, the rest was removed.

MR. BARTMAN: If you don't mind me interrupting you, Jim.

MR. DUNN: Sure.

MR. BARTMAN: But, what we did, we determined the risks and then Baker determined what the remediation levels, what level that they were going to need to remediate to.

When Jim went out and did his screening, all those points are points above what we determined our remediation levels were going to be.

Levels already protective of the individual receptors, the current civilian Base personnel.

So, everywhere that he has a black circle is above those remediation levels that we've determined.

MR. DUNN: Once we got all this sampling, we then went into remediation.

Let me take you back.

Those are all the sample points. They're not all hot. They're the sample points.

We ended up with this configuration being the areas that were excavated.

Where you have a double hash, the depth went down to two feet.

The remaining areas, the depth was to one foot.

But, that was the configuration of the final excavation.

By doing this gridding initially we saved both time and knowledge.

In the concept, we could've gone out and simply excavated the areas that Baker had delineated for us, the full areas.

By going out and doing all the gridding, we ended up with these areas which (a) were less and (b) were exactly the areas of the pesticide contamination.

When we finished with the excavation, a final sampling effort was conducted and in the final sampling

effort, we procured a sample every 50 lineal feet of sidewall and every 500 square feet of base in every excavation.

If we got an excavation that was less than 500 square feet, we had a sidewall and a base.

These samples were tested on-site with our GC and then sent off-site for confirmation by an accredited lab.

We ended up excavating 988 tons of material.

The original engineer's estimate I believe was around 700 tons.

During our process of finding a disposal site, we found a facility in Michigan that could take this pesticide contaminated material, stabilize it and put it in their Class C hazardous waste landfill at a price substantially cheaper than we had been previously quoted.

So, we ended up able to do the additional work on this delivery order and still have a savings overall for the government for this removal action.

Specifically, this material went to a facility called EvoTech in Belleville, Michigan.

MR. CALLAWAY: So, basically, they take ownership

of it after it's been delivered.

MR. DUNN: That's correct.

MR. CALLAWAY: The Base maintains ownership until delivery.

MR. DUNN: That's correct.

I've got some after-the-fact construction photos which are part of our final report.

They're a little different than the site that Matt showed earlier.

[Whereupon Mr.Dunn then distributed photographs]

This is the start which runs start to finish right through the set.

MR. BARTMAN: In going back to, you know, the initial investigation of what we thought the problem was, the upper right hand corner, we will see none of the excavation took place.

Those are where the soil mounds are.

That's where we thought our problem was.

Thank you, Jim.

And, we thought that was going to be our problem and as luck would have it, we just started to investigate other areas.

The largest excavation area which is one sample point and that particular sample point just happened to come up with the hardest hit of pesticides in the surface soil and from there, it grew into that large excavation area.

And, you can assume, you know, well, why did this happen?

Well, I mean, it's a pesticide mixing area.

There's a dirt access road that goes back to the soil mounds.

One day somebody came, had excess mixture in their tank, pulled the plug--

MR. DUNN: A little tricky thing that was in here - there's a septic tank drainfield--

MR. BARTMAN: Oh, yeah.

MR. DUNN: --Right in the middle of that.

This area, a two foot excavation, got down to the top of the drainfield, but amazingly enough, the drainfield had not been contaminated with pesticides.

So, it hadn't got into the septic field at all.

MR. BARTMAN: That's another lucky thing.

MR. DUNN: Our backhoe did, but the pesticides

didn't!

MR. BARTMAN: I mean, Nature worked to our benefit here also because we were dealing with a pesticide contaminant, not a very migratory contaminant, stayed on the surface and you can see from that excavation, mainly in the first foot.

MR. DUNN: Well, the first sixteen inches of material in this area was loam and it was all hot.

I mean, once we got down to soil, they could get to the individual areas that were and weren't.

MR. SWARTZENBERG: Did you fill it back in?

MR. DUNN: Yes.

MR. SWARTZENBERG: So, it's clean now?

MR. DUNN: Yes. We'll get the pictures to you, too.

The fill from this particular site came from the Bay, I think.

MR. SWARTZENBERG: Let me just ask a question.

You contracted somebody to move them - trucks?

MR. DUNN: Yes.

MR. SWARTZENBERG: To move the dirt, you contracted somebody?

MR. DUNN: Yes.

MR. SWARTZENBERG: Is there any special insurance policy in case the truck gets in a wreck or something?

MR. DUNN: Five million required of the trucker and ten of us.

MR. SWARTZENBERG: So, that's an insurance policy more or less of--

MR. DUNN: It's hazardous waste transporter's insurance.

MR. SWARTZENBERG: Hazardous, yeah.

MR. DUNN: They carry it and we carry it.

MR. SWARTZENBERG: Okay.

MR. DUNN: Yeah, there's about I would say 25 licensed hazardous waste haulers that serve this area.

MR. SWARTZENBERG: Oh, so, they have--the drivers have special qualifications?

MR. DUNN: Yes, the drivers have to be trained, carry cards and carry qualifications.

They're limited in the hours they can run just like long haul.

MR. CALLAWAY: Basically, they go to a class that teaches them how to handle the particular items that

they're transporting, in addition to the regular DOT certifications they have to have.

MR. DUNN: Correct.

They haven't gone to 40 hour training yet, but they do have 24 required of them.

MR. BARTMAN: Correct me if I'm wrong, Jim, but this was completed in '95 or '96?

MR. DUNN: '96.

MR. BARTMAN: '96.

MR. DUNN: We started in March and we finished in early August.

That is the entire time frame of--

MS. WOOD: Screening?

MR. DUNN: --screening, drawings, getting into the field and doing the work.

The real field work was done in about six weeks.

MR. BARTMAN: Okay.

MR. DUNN: Early June to middle to late July.

MR. BARTMAN: For me, that's expedited.

MR. DUNN: That's pretty quick.

MR. BARTMAN: I mean, to go out there and find the problem, investigate it, fill out or write a report,

talk to the individuals involved, you know go through the design and then get it hauled out and moved out of there, you don't see it happen that quick too often.

MS. DEBOW: Pretty dramatic.

MR. CALLAWAY: Couldn't you use your pit that you've got over on two or three that you've designed to do some of this?

Would this not fall in the category of something that would work there?

MR. DUNN: There was a lot of discussion on that.

Thus far, pesticides have not been a successful bio-candidate.

I think they may be in the future as bio-technology grows.

The thing to remember, the biocells now are permitted for non-hazardous materials.

MS. DEBOW: Oh, okay, I see.

MR. DUNN: You can permit a hazardous biocell, site specific, site only currently.

That may change but it hasn't at this stage and I don't know of any move to change.

MR. CALLAWAY: So, in other words, if we found an

area that had just say a million tons and it was cost prohibitive to transport it to Michigan or wherever, we could possibly get a permit to have a biocell there on site?

MR. DUNN: Or, look at other in-situ technologies, absolutely, yes.

MS. DEBOW: Looking at the arsenic levels on Site 80, I want to see if I'm reading this right as I was wondering whether you would be intending to re-test the groundwater for arsenic particularly at NWO.3 where it was high?

MR. DUNN: NWO.3 was.

MS. DEBOW: I think that was one that--and I may be reading it wrong.

MR. BARTMAN: No.

MR. DUNN: NWO.3 was removed as part of remedial action. That was right in the middle and wasn't it the bum well?

MR. BARTMAN: Yeah, it was a well that was put in. In 1991, they did the SI. That's when that was put in.

That well was poorly constructed and not a valid, I would say a good sampling point.

MS. DEBOW: Deteriorated?

MR. BARTMAN: Deteriorated, yeah, over time, sand packed.

Again, the turbidity, sediment, so was the arsenic truly representative of the water or the particulates that were in the water?

And, we felt from what we could see in the repetition sampling and the fact that you don't have a groundwater anywhere else, arsenic doesn't show up in the other wells, that that particular well - and from our field notes and during development of that well, some of the readings that we take, the turbidity readings - that that well was--the construction of that well was in jeopardy.

MS. DEBOW: That's valid.

Now, I didn't see in here that we have proven that we have reduced the arsenic below Federal standards and in the ecological studies I did see that there was an elevated quotient of index to rabbits and other things, so what I'm wondering is did we remove the arsenic?

Can we go ahead and assume the--

MR. BARTMAN: No, the arsenic in soil was

removed.

We didn't mention it, but the arsenic was removed - was addressed and removed as part of the time critical removal action.

MS. DEBOW: Yeah, and I do see--

MR. DUNN: In the soil.

MS. DEBOW: --Where it says we did that. I mean, that's where I couldn't see closure.

MR. DUNN: [Showing photograph]--This is where it was removed and this is the replacement that we put in.

MS. DEBOW: And, this one's fine.

This one's giving us good value.

MR. DUNN: Yes.

MS. DEBOW: And, then around this site, we're now getting valid low arsenic levels?

That's where I missed the last closing statement.

MR. DUNN: Matt, when was your last round?

MR. BARTMAN: Geez! We had arsenic initially at 102.

Our second round, we dropped to 42.

MS. DEBOW: Which is below.

MR. BARTMAN: Which is below, yeah, the State standard.

MS. DEBOW: And, that was one test.

So, what I'm wondering is are we going to do one more test or is one considered sufficient?

MR. BARTMAN: Do you want to field this one?

MS. LANDMAN: Isn't that a part of the monitoring?

MR. BARTMAN: There is no monitoring site.

MS. LANDMAN: In this particular case because we questioned the validity of the original sample.

MR. BARTMAN: Also, we have one sampling point above that criteria.

MS. LANDMAN: Right.

MR. BARTMAN: If it were known that arsenic were a widespread groundwater problem, or suspected widespread groundwater problem, you would continue to sample those points.

MS. LANDMAN: In this particular case, we didn't feel it was necessary to go back out and sample it again.

MS. DEBOW: Well, that's kind of the way I would read that.

From what you're telling me now, that even though we've dedicated some part of this write-up to tell ourselves that the arsenic levels were more than twice standard, we also are saying now that that was due to one aberrant value.

And, so now we're just going to ignore that aberrant value because we got a good value but we're not going to validate that that's true - determine which one's right, is that what I'm hearing?

MR. BARTMAN: One additional sampling is not why we're saying that it's valid.

MS. DEBOW: Okay. I like that.

MR. BARTMAN: Right.

We're saying that it's valid because arsenic in the initial round was not a problem, with the exception of one well.

So, we didn't find a site related arsenic problem.

We confirmed that, that one point was not a problem and that it was the construction of the well that was causing the problem and the sediment caused that elevated hit by doing that second round of sampling.

MS. DEBOW: Okay. Because the second question I had was concerning the environmental impact, the ecological studies--

MR. BARTMAN: Uh-huh.

MS. DEBOW: --Where it discussed the ecological quotients for rabbits as being high and I keep thinking of hawk seeking rabbits, so since arsenic will bio-accumulate I was somewhat concerned that the terrestrial receptors really could be accumulating anything left over.

That was my next question.

We didn't prove that that was not due to arsenic, but there's no comment in there that it probably was due to the pesticides that were removed.

MS. LANDMAN: Pesticide and the arsenic.

MS. DEBOW: And, the arsenic?

MS. LANDMAN: That were removed and the risk values for the ecological receptors were based on the site conditions prior to remedial action.

So with the removal of that soil--

MS. DEBOW: Should improve the risk values?

MS. LANDMAN: That should at least go away because there are no more.

MR. BARTMAN: It should. It's actually--

MS. LANDMAN: Right.

MR. BARTMAN: --Part of Gina's requirements that we demonstrate that removal of those soils, the remaining soil that's left.

So we demonstrate using those values that we have taken through our risk assessment demonstrate that those levels are not acceptable.

MS. LANDMAN: The remediation levels that were determined for removal of the soil were based on reducing the risk to both human health and ecological disasters to an acceptable level.

That's how they were calculated, so the clean-up was based on basically a back calculation of what levels do we need to reduce these risks down to acceptable levels.

We worked backwards. What does that become in the concentration.

Then we go back out to the site. All the areas that exceed that concentration were removed.

MS. DEBOW: And, particularly relative to arsenic, that 42 says we did that for arsenic?

MR. BARTMAN: No, 42 is in the groundwater.

MS. DEBOW: In the groundwater.

MR. BARTMAN: Right.

MS. LANDMAN: And, the risk to the ecological receptors were in the surface soil exposure.

MS. DEBOW: Okay.

MR. BARTMAN: So, it's where you take care of it in the soil.

MS. DEBOW: Gotcha!

MR. DUNN: The arsenic number in groundwater is probably very false.

Arsenic is a very, very heavy element and arsenic sticks to the soil and sediment and my guess is that those samples were not done with low flow.

MR. BARTMAN: The initial sample was not done low flow.

MR. DUNN: Okay.

MR. BARTMAN: That's why the second sample was done low flow in order to reduce the level of turbidity in that well we knew was poorly constructed, but we have to demonstrate, just like you're asking that question. That same question was posed by Gina and at that time, Dave's

counterpart, Patrick Walters, proved to me that it's well construction, not truly in the groundwater.

So, that's why we had to do additional sampling.

MS. LANDMAN: And, to add to the complication of that is we had to remove that well during the soil removal.

So at that point the question is do we have any reason, do we have enough concern to going back out and install a new well to replace it, take another sample or not?

We have all this evidence to show that this is no longer an issue, so what would we gain by just spending time and money to go back out there to re-install the well, to sample it one more time?

And, that's really what it boils down to.

MS. DEBOW: Now, on Site 7, I had a comment.

I was somewhat curious about the swamps down at the bottom end of Site 7.

MR. BARTMAN: I think it's a marsh.

MS. DEBOW: Marsh?

MR. BARTMAN: I get corrected.

MS. DEBOW: Salt marsh.

MR. BARTMAN: There is a difference and I get corrected.

Our ecological--I'm sorry.

MS. LANDMAN: It's both.

MR. BARTMAN: I don't know, I get corrected by ecological scientists all the time.

I say swamp. She says it's not a swamp, it's a marsh, so I don't know.

MS. DEBOW: If there are cypress trees in it, it's probably more swamp.

MR. BARTMAN: Okay.

MS. DEBOW: If there's just flats with grasses, it's probably salt marsh.

MS. LANDMAN: There's probably areas of both.

MS. DEBOW: Yeah.

We saw some decrease in macro-invertebrates in surface water down there. I couldn't quite tell what that meant.

To me, it means we that we saw a decrease in the number of clams, mussels and other macro-invertebrates that live on the bottom in the low waters of salt marshes.

Is that what I was reading? And, that wasn't

explained as possibly why, other than maybe it's due to this toxicity.

MR. BARTMAN: I get all the tough questions!

Ask a human risk question.

The fed.fix are not clams, mussels, they are micro-organisms.

MS. DEBOW: Not macro-invertebrates. The macro invertebrates are my oysters.

The micro-invertebrates are the little guys.

MR. BARTMAN: Okay. See, I told you.

MS. DEBOW: And, this says macro-invertebrates so that's my oysters.

MS. WOOD: On Page 8 if anyone wants to follow.

MR. BARTMAN: Yeah.

I don't have an answer for you at this point.

MS. DEBOW: It seems what I'm reading here that where my concerns lie are although we are prohibiting groundwater consumption and from what you told me, we're not prohibiting residential pesticide use in this area so we're going to continue to have groundwater runoff, which may not be a RAB issue.

It may be a Camp Lejeune issue.

But, we do have some ecological impact and we haven't figured out why.

That's what I saw here that even this didn't quite identify why we're seeing ecological impact.

It could be the lead.

We've got a couple of things going on there and I was wondering if you knew anymore about that.

But, I read it as shrimp and mussels and dinner that we might be losing.

MR. BARTMAN: I don't think that's the case.

I can't give you an answer right now.

MS. LANDMAN: Can we get the ecological risk assessment person--

MR. BARTMAN: Oh, yeah.

MS. DEBOW: Thanks.

MS. LANDMAN: --Make a phone call to you and discuss the issue?

MR. BARTMAN: Yes.

MS. DEBOW: Sure, sure.

MR. BARTMAN: I apologize for that. That is not my area. I mean I should know this, but it's not something that's fresh in my mind.

MR. HUMPHRIES: Yeah, I don't think you can get--

MS. DEBOW: It may not even apply to this. It may be something where we can say, hey, look by the way, even though this isn't due to our off-site, it's something that you in the community need to be aware of and maybe use less pesticides on your lawn at Tarawa Terrace.

MR. BARTMAN: Uh-huh.

MS. DEBOW: Or, something like that.

MS. WOOD: They're not using pesticides on the lawns.

MS. DEBOW: I have no idea, but whether it's a RAB issue or just the way I was reading this leads me to believe it's a RAB issue.

MR. SWARTZENBERG: You can't get oysters to grow in water unless you've got at least--you know, I've heard of oysters growing in ten parts per thousand, but we don't have anything like that up in this area.

You have to at least get down on Courthouse Bay before you get anything like that.

The clams even less.

In fact, the hurricane killed a lot of clams because there was so much fresh water.

MS. LANDMAN: I'm pretty sure that most of the samples probably were crabs and I don't know what you call them--

MR. BARTMAN: Crayfish.

MS. LANDMAN: --They're just tiny little things.

MR. BARTMAN: I mean, this is all fresh--

MS. DEBOW: These are all indicators.

MS. LANDMAN: Right.

MR. BARTMAN: Right.

MS. LANDMAN: I agree with you. That's why we need to get you talking to the ecological person to answer any questions.

MS. DEBOW: Something's going on there, the way this is written and I'm not quite sure what it is.

Whether it's related to this off-site or something else, but something's going on there.

MS. WOOD: Well, to be anecdotal which doesn't help you at all, but we used to ride our horses down the Boy Scout area which is down, you know, from there and take off the point there and swim, we had a great time for several years.

MR. BARTMAN: Uh-huh.

MS. WOOD: And, finally, we discovered we were coming out of that water with skin rashes and an awful odor and so we gave up that in particular.

So, I don't think it's necessarily related. It's been an ongoing accumulation of variety of things in this whole area.

MR. BARTMAN: Do they say what that's caused from?

MS. WOOD: I don't know. We just decided, you know, there was a whole group of us that we did not need to be in that water on those horses any longer, you know.

MR. BARTMAN: Does the treatment plant discharge in that area?

MS. LANDMAN: If you're up in the Montford Point area, that's well up there.

MS. WOOD: No, this is you know where the--

MS. LANDMAN: Okay, you're across the creek.

MS. WOOD: I'm on the same side. It's further down toward the entrance we used to go.

The golf course is here. The Boy Scouts area is down there and we'd, you know, go off and--

MS. LANDMAN: Right, that's on the other side of

Northeast Creek.

MR. BARTMAN: Yeah, you're the other side of site 7.

MS. WOOD: You're right.

MS. LANDMAN: That's right.

MS. WOOD: But, my point is that whole water--

MR. BARTMAN: That whole water area.

MS. WOOD: --has deteriorated in the last 25 years.

MS. LANDMAN: But, in response to your question, I suggest we get the ecological best person from Baker to discuss the issue with you and then perhaps we can get a summary of that conversation into the meeting minutes that go out to all the RAB members.

MR. BARTMAN: Right, that'll be in the file record of decision because it is a public comment--

MS. DEBOW: Thank you.

MR. BARTMAN: --That has to be addressed.

MR. HUMPHRIES: I've got a question on Site 7.

Several years ago, there was a cleaners approximately 800 yards from here that was dumping tetrachlorethylene into the groundwater.

MS. LANDMAN: ABC Cleaners.

MR. HUMPHRIES: Yeah, I didn't want to say the name.

They went to litigation with the EPA.

Whatever happened?

MS. TOWNSEND: They are working on that now.

They're in remedial action now.

It will soon be public record and they should have a repository set up.

MS. LANDMAN: It's at the Onslow County Libary?

MS. TOWNSEND: Yeah, that's what I've read that you can see all the documents associated with it, but that is definitely a superfund site and they are remediating.

And, they have gone through the same public meeting process that we have, although it's just one site so they don't have meetings as frequently as we do, but they have gone through the same process that we have for investigation and remediation, although it's taken them a lot longer.

And, a representative from the Base attended almost every one of those meetings.

MS. CASEY: I think probably Tom was probably the one.

MS. TOWNSEND: I know Tom was attending them.

MS. CASEY: Yeah.

MR. BARTMAN: The lead-in was supposed to go from the session on the time critical removal action to Rich's discussion.

[Whereupon this part of the proceedings concluded at 8:45 o'clock p.m.]